Rheem Australia Pty Ltd

ABN 21 098 823 511

SERVICE INSTRUCTIONS

H.S.I Heavy Duty Gas

TM011

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Safety Warning

The purpose of these instructions is to provide sufficient information to allow a person with the skills required by the Regulatory Authorities to carry out effective repairs to a Rheem Gas Heavy Duty Water Heater in the minimum of time.

Safety precautions or areas where extra care should be observed when conducting tests outlined in this service manual are indicated by print in ***bold italics*** and/or a warning symbol. Take care to observe the recommended procedure.

If the supply cord is damaged, it must be replaced by the manufacturer or its service agent or a similarly qualified person in order to avoid a hazard.

When conducting repairs to a gas appliance the gas train including injector sizes must not be altered or modified in any way.

Certain diagnostic procedures outlined in these service instructions require "live" testing to be conducted. Personal Protective Equipment should be worn when conducting these tests to prevent the risk of electric shock. (Refer to Rheem Safety Procedure on electrical testing)

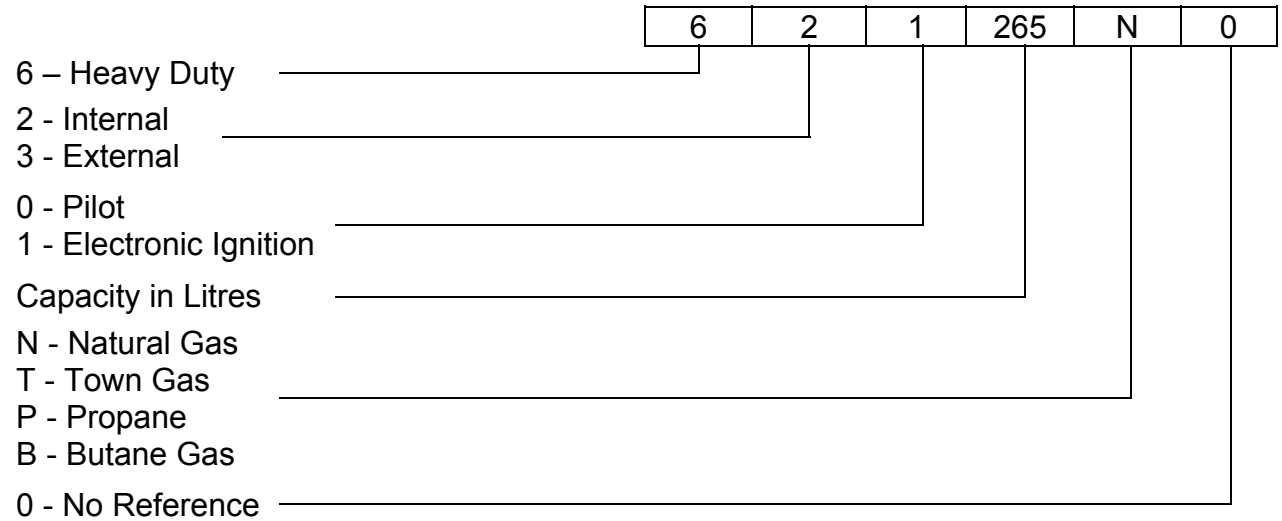
Introduction

The information provided in these instructions is based on the water heater being installed in accordance with AS5601 and the Installation Instructions provided with each water heater.

Should you require further technical advice on a Rheem Heavy Duty Gas Water Heater, contact your nearest Rheem Service Department where genuine replacement parts are also available.

Heater Model Identification

All identification numbers are designed to convey detailed information about the heater to which it is attached. For example the model number consists of 7 digits and 1 letter.



Note: Model number, serial number and date of manufacture must be quoted in all correspondence.

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Specifications

		Model			
		621265	631265	621275	631275
Maximum Water Supply Pressure (kPa)	With ECV	680	680	680	680
	Without ECV	800	800	800	800
Minimum Gas Supply Pressure (kPa)	Natural Gas	1.13	1.13	1.13	1.13
	LP & Butane Gas	2.75	2.75	2.75	2.75
	Town Gas	0.75	0.75	0.75	0.75
Maximum Gas Supply Pressure (kPa)		3.5	3.5	3.5	3.5
Maximum Thermostat Setting (ºC)		82	82	82	82
ECO Cut Out Temperature (ºC)		84-90	84-90	84-90	84-90
Anodes	Qty X Length (mm)	3 x 1150	3 x 1150	3 x 1153	3 x 1153
Flue Baffle	Dia x Length (mm)	38 x 600	Not fitted	76 x 845	76 x 845
Water Connections	Diameter	RP1¼/32	RP1¼/32	RP1¼/32	RP1¼/32
T&PR Valve	Diameter Rating (kPa)	RP¾/20 1000	RP¾/20 1000	RP¾/20 1000	RP¾/20 1000
Gas Connection		RP¾/20	RP¾/20	RP¾/20	RP¾/20
Burner Injector (mm)	LP Gas	2.90	2.90	3.80	3.80
	Natural Gas	4.80	4.80	6.50	6.50
	Butane Gas	2.50	2.50	3.20	3.20
	Town Gas	8.60	8.60	10.50	10.50
Burner Pressure (kPa)	LP & Butane Gas	2.50	2.50	2.65	2.65
	Natural Gas	0.85	0.85	0.90	0.90
	Town Gas	0.32	0.32	0.50	0.50
Thermal Input (MJ)		110	110	200	200

Preventative Maintenance

For peak performance it is suggested that the water heater be inspected prior to the winter period where light to medium hot water usage occurs and six monthly where medium to heavy usage occurs.

1. Check for discharge from the T&PR valve. Whilst the burner is off there should be no discharge of water. When the burner is operating, a small discharge of water may be evident. Operate the valve-easing lever to ensure the valve opens and resets properly. Always open and close the valve gently. The T&PR valve should be replaced at 5 yearly intervals.
2. Check the combustion chamber and burner for signs of scale deposits. Remove and clean if necessary.
3. Check the main burner pressure is as stated on the Rating Plate Remember to replace the test point screw.
4. Check main burner flame to ensure all parts ignite readily and that the flame is blue with little or no yellowing of the tips. If necessary adjust the interrupter screw to eliminate yellowing without inducing a harsh noisy blue flame.
5. Check the drain cock is not leaking.
6. Check for sludge build up and if necessary drain and flush tank.
7. Inspect and if necessary replace anodes. (Hard water areas only)
8. Check for signs of excessive corrosion on the jacket.
9. Check operation of auxiliary equipment i.e. circulator
10. Warn customer of the danger of using flammable materials or aerosol spray packs near the water heater. Aerosols and harsh chemicals can cause premature failure of water heater components.

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Lighting Instructions

The water heater incorporates an automatic ignition system. Switch on the power, when the controlling thermostat registers heating is required the ignition sequence will commence automatically. Should the unit fail to light after 4 ignition attempts the electronic control system will enter lockout mode.

Operation

Heat Mode

1. Thermostat contacts close to call for heat

   621265 and 631265 – Power supplied to ignition control module.

   621275 – Flue damper opens and proving limit switch closes supplying power to ignition control module. **NOTE:** During standby (thermostat contacts open) the flue damper is held closed by power being applied to the flue damper motor.

   631275

   Manufactured Before 09/02/05 – Combustion fan and relay energised. Proving switch contacts on pressure switch close when combustion pressure is achieved supplying power to ignition control module.

   Manufactured After 09/02/05 – Power supplied to ignition control module. The ignition module checks (position proves) pressure switch is open and if so then supplies power to the combustion fan and then checks that the pressure switch has closed.

2. The hot surface igniter warm up period commences (20 seconds)

3. At completion of the warm up period the gas valve is energised and opens to allow gas to the main burner where ignition takes place.

   Note: A door switch is wired in series with the gas control on the 631275. The gas control will not operate if the access door is not in place.

4. The igniter is de-energised at the conclusion of the igniter activation period (I.A.P), normally referred to as the ignition proving time, which is 2.5 seconds or proof of flame.

5. Thermostat contacts open when set temperature is achieved.

   621265 and 631265 – Gas valve is de-energised cutting supply of gas to the burner

   621275 – Flue damper closes and proving limit switch contacts open. Gas valve is de-energised cutting supply of gas to the burner.

   631275

   Manufactured Before 09/02/05 – Combustion fan and relay de-energised. Proving switch contacts on pressure switch open when the pressure drops below required combustion pressure. Gas valve is de-energised cutting supply of gas to the burner.

   Manufactured After 09/02/05 – Combustion fan and gas valve is de-energised cutting supply of gas to the burner. Proving switch contacts on pressure switch open when the pressure drops below required combustion pressure.

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Retry Mode

If flame is not sensed during the Ignition Activation Period (2.5 seconds)

1. The gas valve is de-energised.
2. The system waits 5 minutes to allow for the escape of unburnt gas.
3. The normal ignition sequence is retried.
4. Igniter period remains at 20 seconds with the control re-entering “learn mode”.
5. The ignition control module will enter “retry lock out”, **1 flash**, if burner ignition is unsuccessful after 3 attempts.

Recycle Mode (Within a Thermostat Cycle)

If flame is established then lost after the I.A.P i.e. after flame was sensed

1. The gas valve is de-energised.
2. Normal ignition sequence is started
3. No increase in igniter warm up time.
4. The ignition control module will enter “retry lock out”, **1 flash**, if burner ignition is unsuccessful after 3 attempts.

Note: Infinite recycles and three ignition retries are allowed during any one (1) thermostat cycle.

Normal Mode

After flame has been sensed, the ignition control module enters the normal operating loop where all inputs are continuously checked.

Lockout or Wait Mode

When the ignition control module enters “lock out” or “wait” modes the condition can be cleared by turning the power off and then on again at the power point or by pressing the reset button for approximately 1 second.
Note: If the fault continues to exist i.e. an open circuit igniter, the module will immediately re-enter the lockout or wait mode and display a fault code.

Safety Features

If the ignition control module is energised and flame is detected when the gas valve is de-energised, the ignition control module enters the “safety wait mode”, **5 flashes**.

If the gas valve is energised 4 consecutive times and flame is not sensed within the I.A.P, the ignition control module will enter “retry lock out”, **1 flash**.

In the event of a flame failure during a heating cycle the gas valve is closed in 0.9 seconds. If flame is not detected within 2.5 seconds from the commencement of the trial for ignition period the gas valve is closed.

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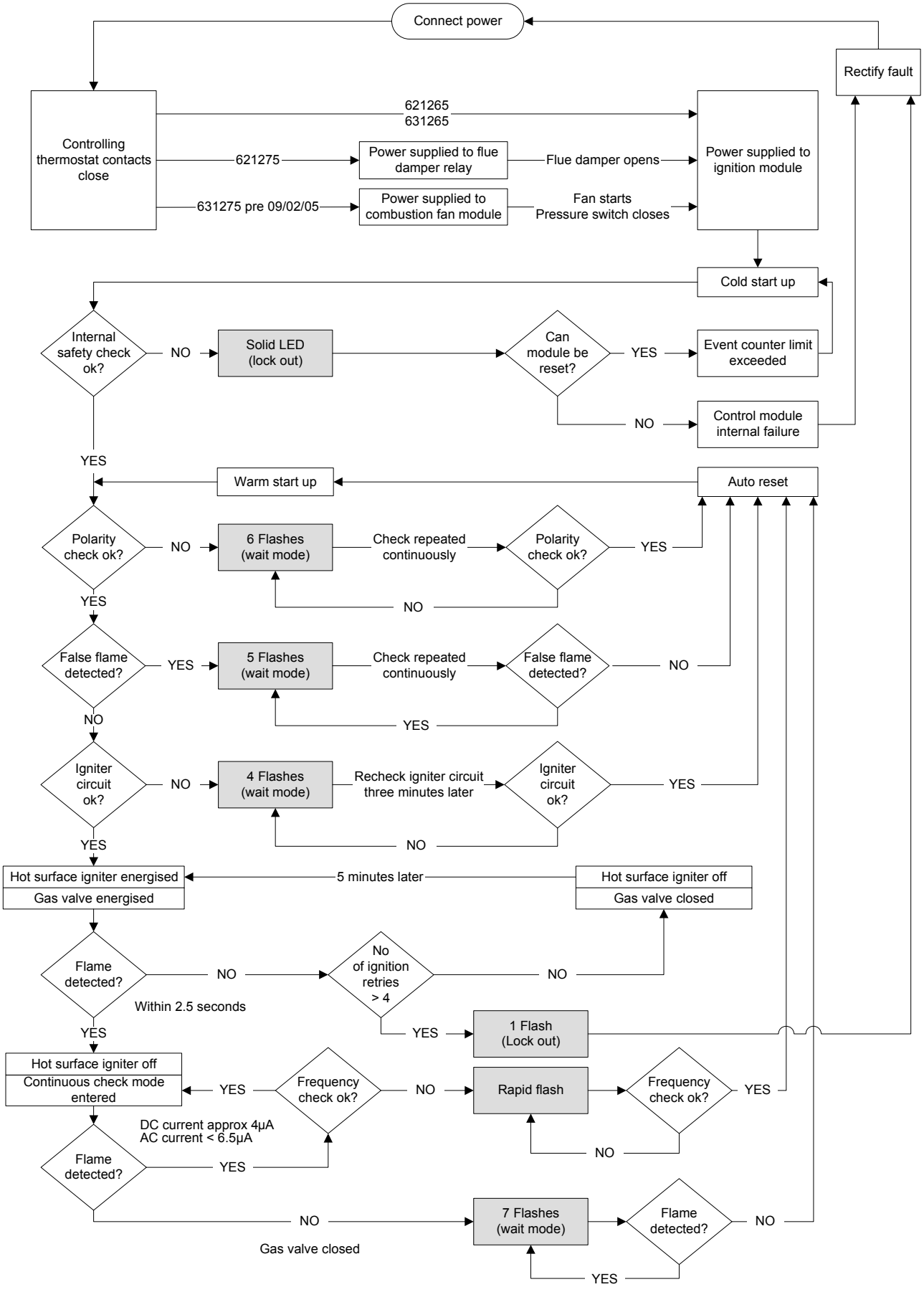
Heating Cycle Flow Chart - 621265, 631265, 621275 & 631275 (Before 09/02/05)



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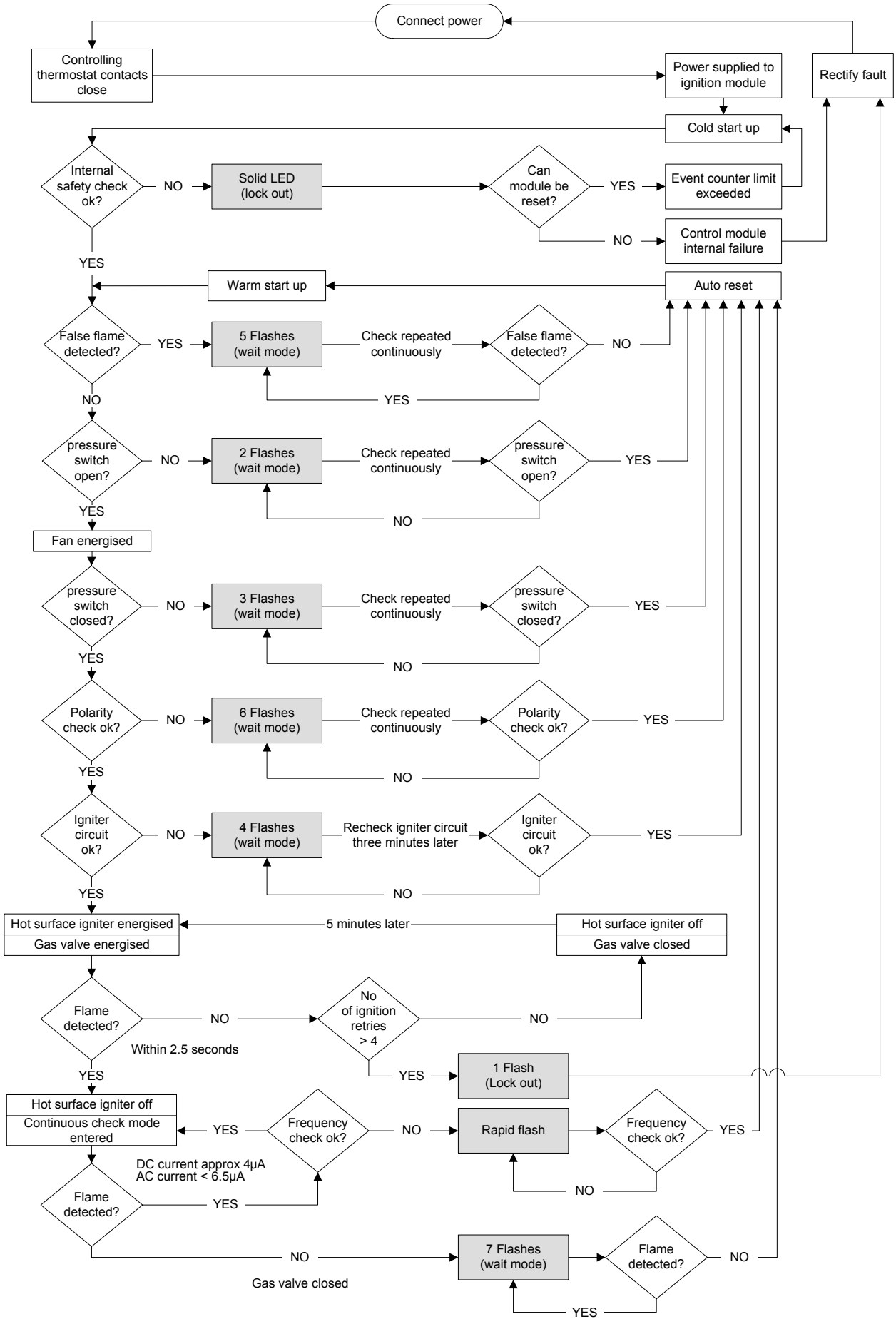
Heating Cycle Flow Chart - 631275 (After 09/02/05)



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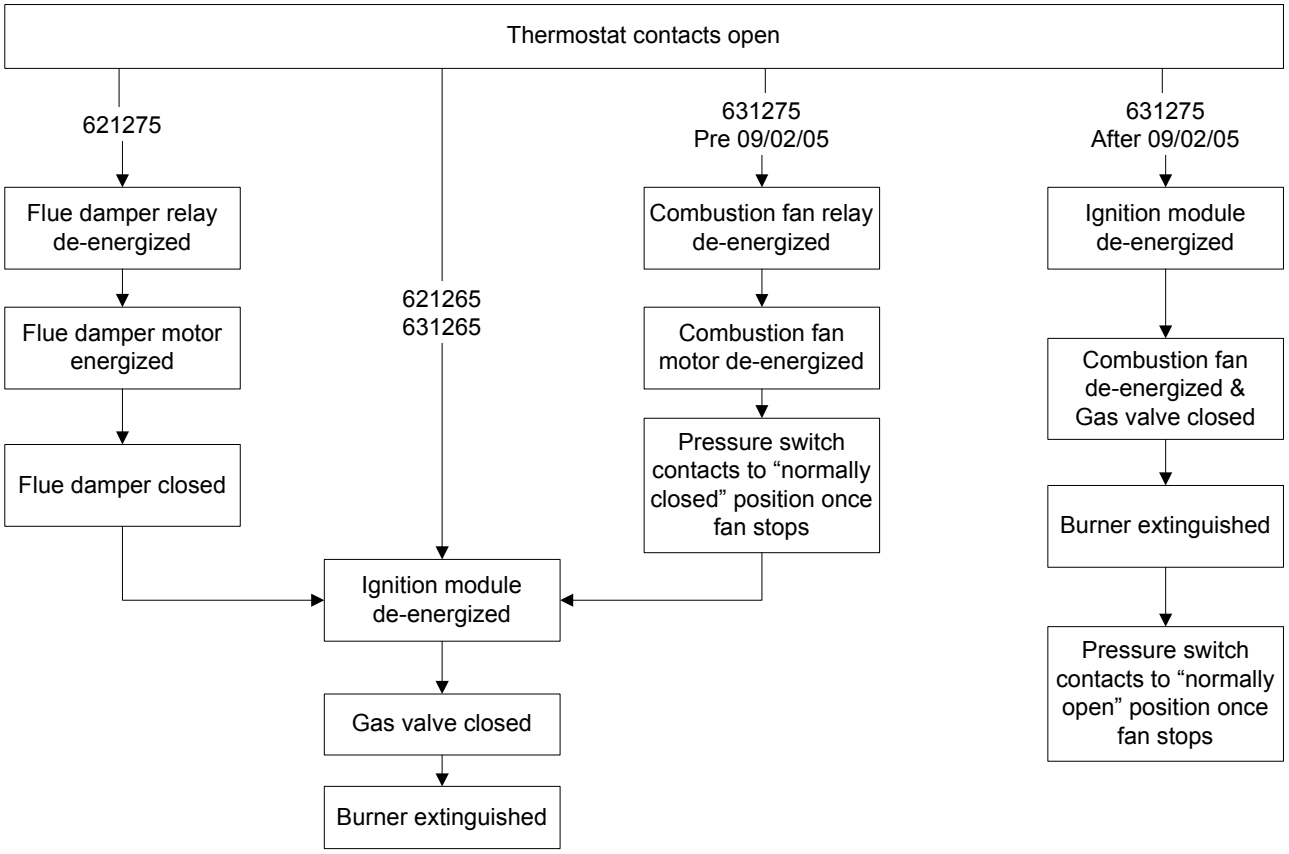
Burner Extinction Cycle Flow Chart



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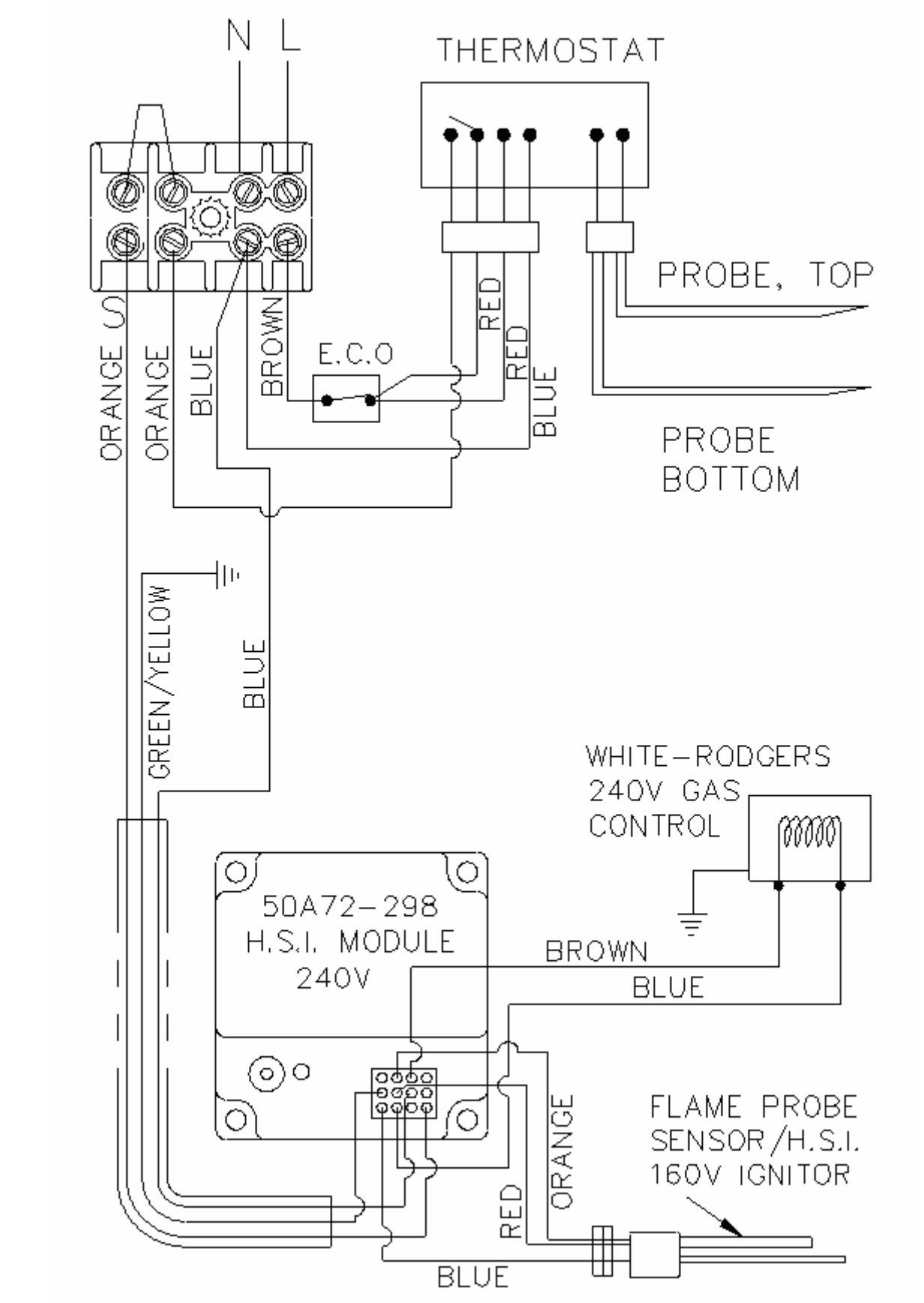
Wiring Diagram 621265 / 631265



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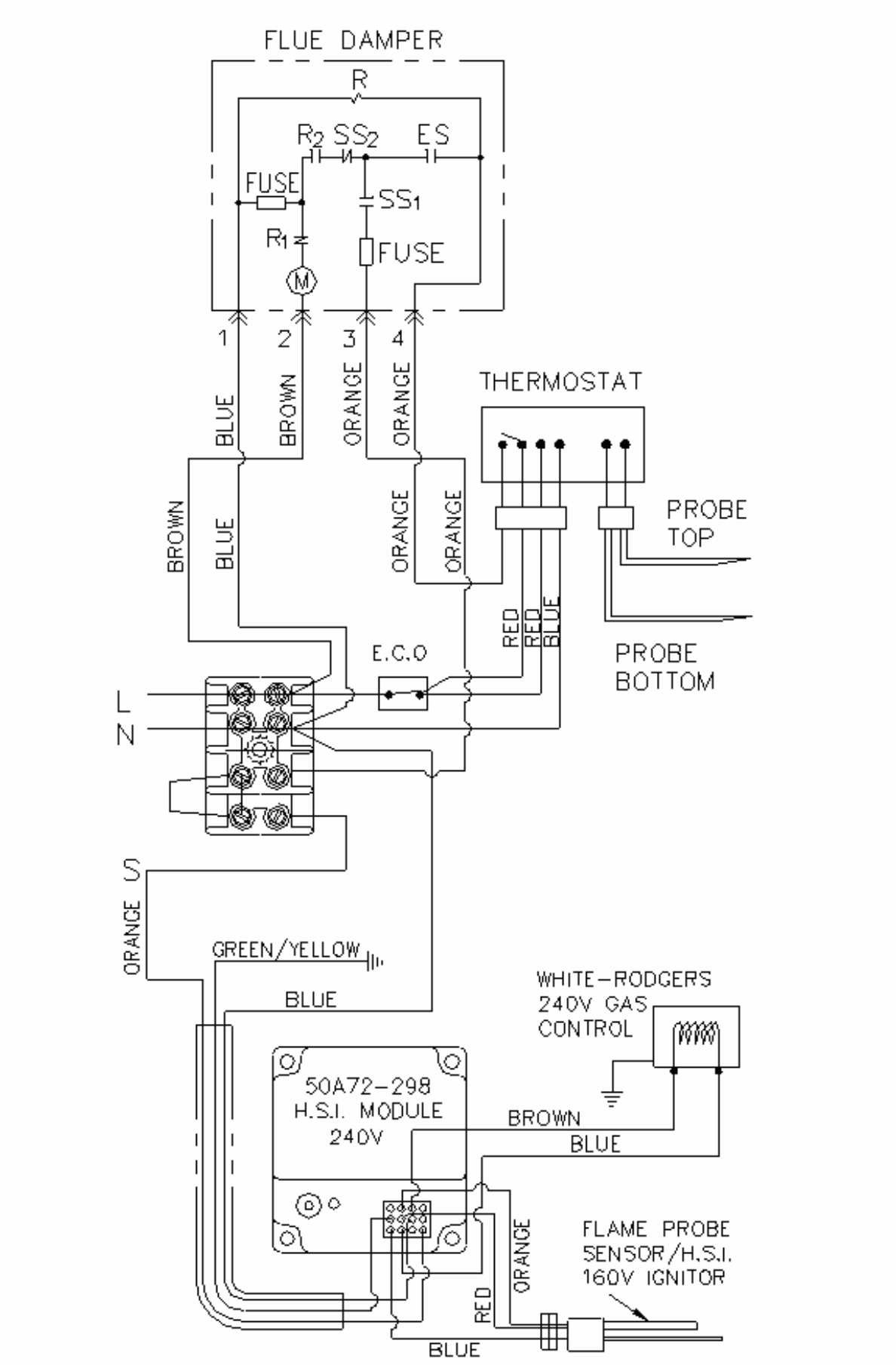
Wiring Diagram 621275



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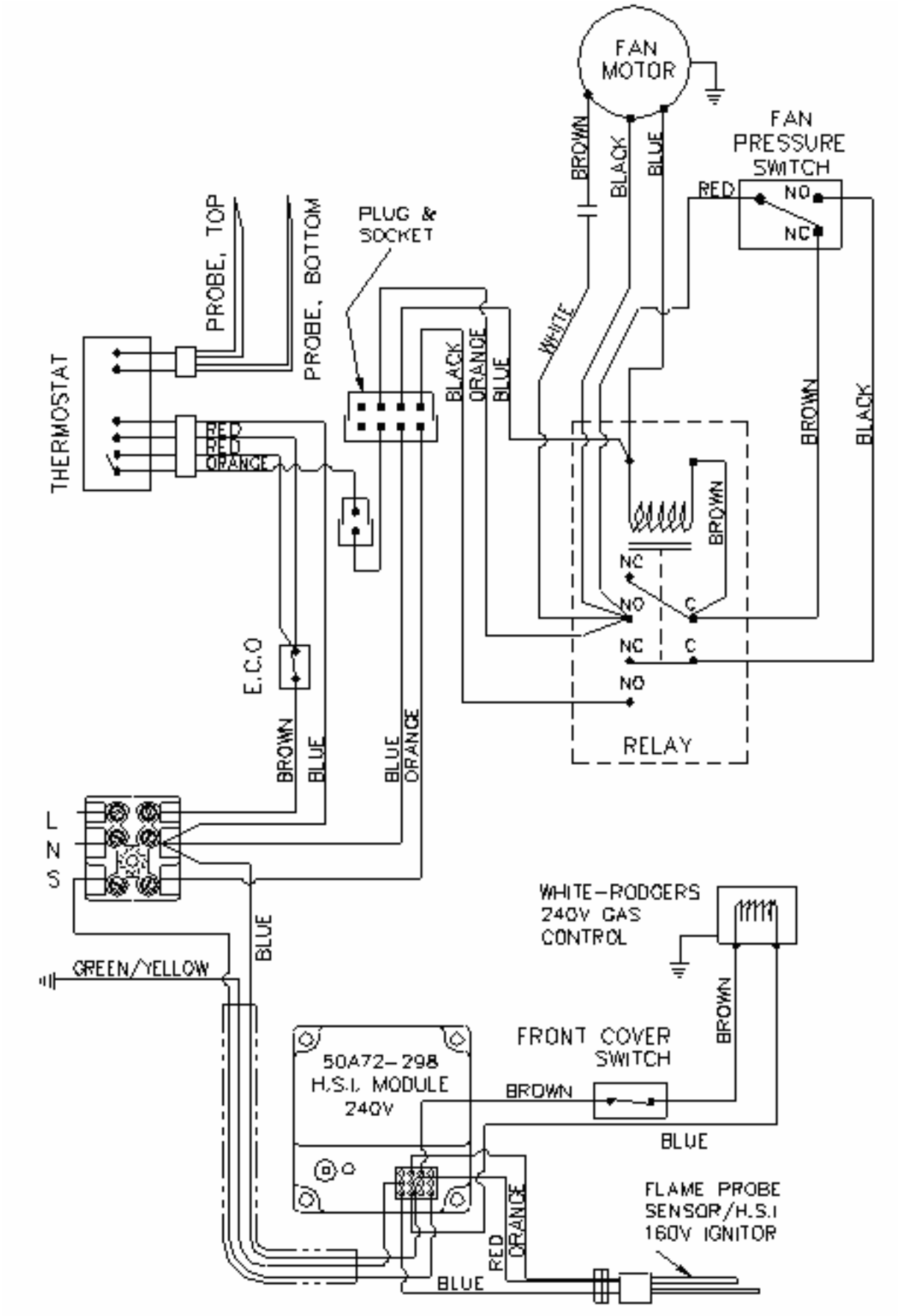
Wiring Diagram 631275 - Manufactured Before 09/02/05



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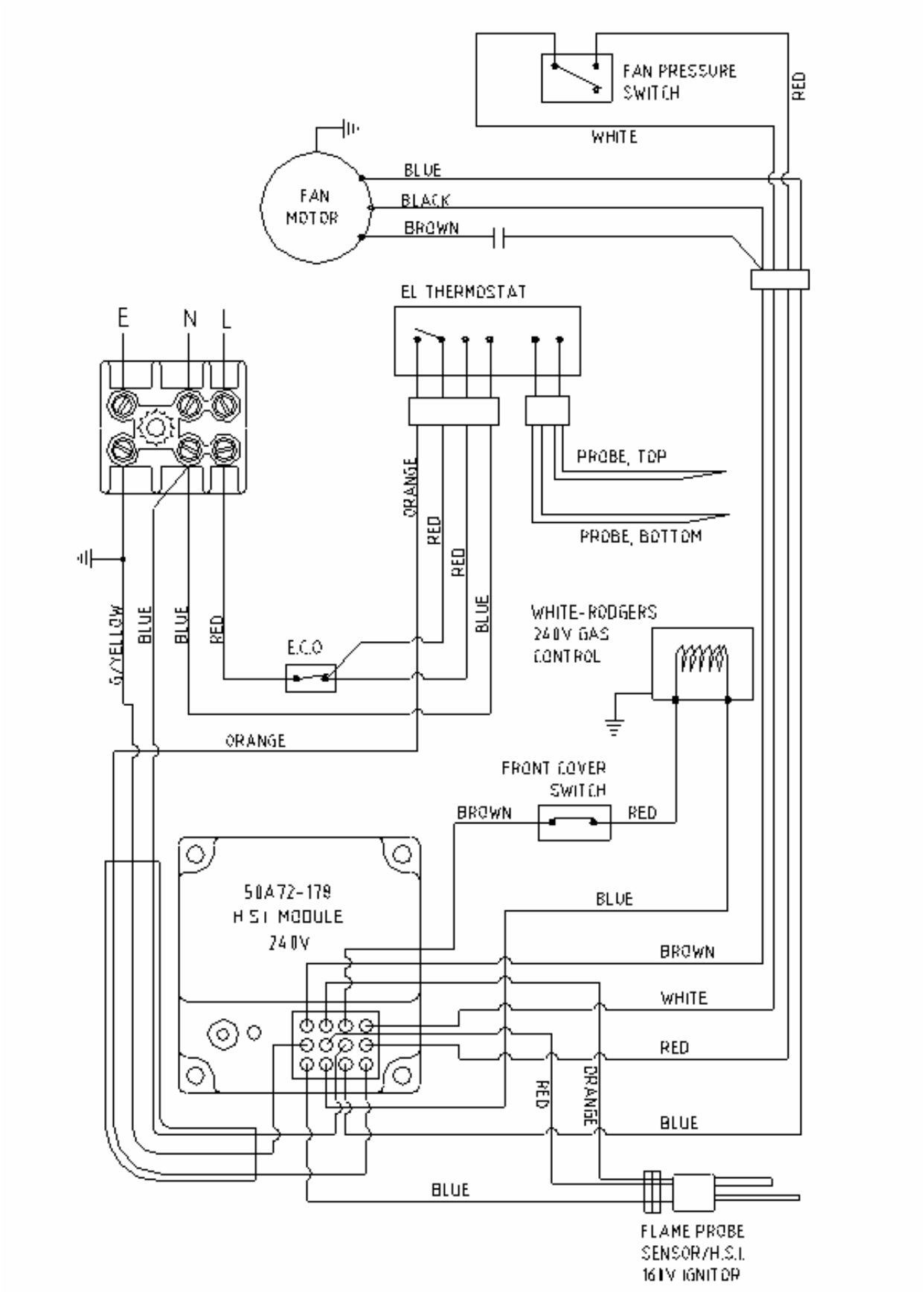
Wiring Diagram 631275 - Manufactured After 09/02/05



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Gas Control Valve: The gas valve is a White Rodgers model 36C90H-408 220/240 volt AC double solenoid valve suitable for use with electronic controllers.

An insulated one-shot thermal fuse is incorporated into one of the solenoid leads to act as a cut out in the event of excessive heat spillage from the combustion chamber.

The thermal fuse will open circuit at temperatures of 90ºC to 100ºC.
The gas valve is gas type convertible (refer to gas type conversion procedure on page 79.

Ignition Module: The ignition module controls the operation of the burner ignition sequence. Each step of the sequence is timed by the controller, in the event of a malfunction the controller will enter either a 'wait' or 'lock out' mode and display an error code on an LED indicated by a series of flashes (refer to page 31).

If the burner fails to light during the ignition sequence the controller will attempt to relight the burner 3 times. If the third reattempt is unsuccessful the controller will "lock out".

Operating temperature range is 0ºC to 60ºC. The controller will operate on a line voltage of 187-264 volts AC. Where the line frequency (50 or 60 Hz) varies by more than +/- 5% the controller will not operate.

Flue Damper (621275 ONLY): The flue damper is designed to minimise heat loss through the flue system during standby.

The butterfly flap is not pierced as the H.S.I heavy-duty range does not utilize a standing pilot.

Prior to the ignition sequence commencing the flue damper is rotated to the open position, two limit switches, 1 primary and 1 safety, are incorporated into the flue damper to 'prove' the damper is open. The flue damper is motor driven closed; a spring mounted on the shaft opens the damper.

A replaceable 1.6 amp fuse is mounted on the damper enclosure to protect the damper PCB from damage should the gas control and ignition control module fail.

Igniter and Flame Probe: The igniter rod is manufactured from Silicon Nitrate. When power is applied, the rod glows to ignite the gas. This system is known as hot surface ignition (H.S.I.)

The flame rod is manufactured from Canthal-D and forms part of the flame proving system. A small electric current is passed from the ignition module to the flame rod and then through the flame to earth. This is known as flame rectification.
Note: The flame proving system will only work when the water heater is connected to a correctly polarised and earthed neutral mains supply.

Over Temperature Energy Cut Out (E.C.O.): A temperature-sensing device that automatically cuts off the power supply to prevent excessive water temperature occurring.

This device will not reset automatically, however it can be manually reset once temperatures have fallen to a safe level.

Anode (sacrificial): A metal alloy electrode which, by galvanic action, protects the inner cylinder from corrosion.

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Temperature and Pressure Relief Valve: A valve designed to provide automatic relief by discharging water in case of excessive temperature, pressure or both.

Never fit a T&PR Valve with a pressure rating greater than that indicated on the product-rating label, do NOT use reconditioned T&PR valves.

Delivery Tube (Dip Tube): A polypropylene tube fitted inside the water heater cylinder to conduct water from the highest point to the outlet connection. It also acts as a fitting liner.

Inlet Diffuser: A device installed in the cold water inlet of the water heater to help control temperature stratification within the cylinder.

Flue Baffle: A baffle inserted into the water heater flue tube that slows the passage of flue gases to ensure maximum heat transfer to the stored water.

Draught Diverter (indoor models): A cowl installed at the top of the water heater between the primary flue and secondary flue to help prevent adverse draughts affecting the gas burner operation.

Combustion Fan (631275 only): A fan and electric motor combination, installed in the air duct to provide sufficient primary air for combustion.

Pressure Switch (631275 only): A device sensitive to air pressure incorporating a micro-switch.

When sufficient pressure is created by the combustion fan the micro-switch contacts close supplying power to the ignition control module (models manufactured before 09/02/05 or closing a proving circuit in the ignition module (models manufactured after 09/02/05)

Relay (631275 Manufactured before 09/02/05 only): An electric coil operating a pair of single throw contacts.

The relay is interlocked electrically with the combustion fan and pressure switch as a safety measure to prevent operation of the gas burner in the event the pressure switch, combustion fan or both have failed.

Product Changes

Controlling Thermostat (All models)

- An AKO electronic thermostat has replaced the Robertshaw mechanical thermostat, allowing accurate temperature and differential control.
- Two temperature sensors (thermistors) mounted in wells at the same heights as the inlet and outlet of the water heater are utilized to detect the water temperature at the top and bottom of the tank. A small electronic circuit board installed in the sensor wiring offsets the cold sensor reading to provide the average temperature for the entire tank.
- The electronic thermostat features an external LED display indicating the water temperature, or in the event of a failure, an error code (refer to page 25).

Viewing Windows

- Viewing windows have been added to all models to allow the LED on the ignition module to be observed without the need to remove any covers

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Ignition Module (All Models Except 631275 Manufactured After 09/02/05)

The 50A72-298 ignition module replaces the 50A72-208.

The new module features

- 3 re-ignition attempts, with a 5-minute delay between each attempt
- Volatile memory. Turning the power off and on at the power point will now reset the ignition module. A reset button is also fitted on the ignition module.
- With the exception of ignition failure (1 flash lockout) the ignition module will enter a 'wait' mode when a fault is detected and will automatically reset if the fault clears.

Ignition Module (631275 Manufactured After 09/02/05)

The 50A72-178 ignition module replaces the 50A72-298. These two ignition modules are not interchangeable, to prevent fitment of the incorrect module the wiring loom plugs are not compatible.

The new ignition module

- Utilises an internal method of checking the pressure switch position (position proving) and also supplies power to the combustion fan rendering the relay and its associated wiring obsolete.
- Eliminates the need for a proving relay in the fan module
- Has two additional fault codes (2 flashes and 3 flashes) both relating to the pressure switch position (refer to page 31). All other fault codes remain the same as the earlier ignition module.
- Has a 30 second delay before energising the fan motor, eliminating fan run on problems associated with power brown outs (refer to page 45).

To overcome fan run on problems, it is possible to convert a 631275 fitted with a 50A72-298 ignition module to use the 50A72-178 ignition module. For full instructions refer to Technical Bulletin TB05 011.

Limit Thermostat

- The auto reset upper limit thermostat has been deleted and replaced with a manual reset ECO thermostat located where the mechanical thermostat was positioned in past models.

Flue Damper (621275 Only)

- A replaceable 1.6 amp fuse has been added to the flue damper control circuit. In the event the gas valve or ignition module suffers a major electrical failure the fuse will blow protecting the flue damper control circuit from any resulting short circuit or power surge.

Access Door (631275)

- A small indentation has been added to the access door to provide a more positive action on the door switch. This modification is to overcome intermittent contact resulting in fan run on without burner operation.

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When a complaint is lodged about the performance of a hot water system there are a number of causes that should be checked and eliminated. In an attempt to pinpoint the most likely cause it is important to discuss with the customer their reasons for the complaint, the duration of the problem, any change in circumstances or usage and recent weather conditions. This information in conjunction with the following listed common complaints will assist in locating the most likely cause. All procedures assume there is water flowing through the water heater.

Water hammer

A water heater will not cause water hammer, however valves associated with the water heater may be the source of the problem i.e. cold-water stopcock, non-return valve, T&PR valve or relief valve.

Most water hammer problems are associated with plumbing, hot and cold, or appliances i.e. solenoid valves, ball cocks, loose pipes, sharp angles in pipe work, faulty or worn valve parts or neighbouring equipment.

High water pressure areas will have more complaints of this nature and the use of a pressure-limiting valve (PLV) to reduce the household cold-water pressure will usually solve most problems.

Excessive hot water usage

The complaints of insufficient hot water and no hot water can on many occasions be attributed to hot water usage exceeding the capacity of the water heater to provide hot water.

When first attending a call of this nature it is essential to establish the probable hot water usage by querying the usage habits of the household and compare this with the potential delivery of the model water heater installed. It can then be established if the usage is within or outside the capacity of the model. The areas to look at for excessive usage are:

1. Automatic washing machines.
2. Showers exceeding 11 litres per minute for mixed water and 5 minutes in duration.
3. Two or more showers operating at the same time.
4. Change of occupancy or number of persons increased.
5. High water pressure area. (Excessive T&PR discharge)
6. Plumbing leaks

Discoloured water

1. This may be the result of discoloured water entering from the cold water mains. Check if the cold water is also discoloured.
2. Brown coloured water will generally indicate that the anode has been depleted or the water heater is near the end of its useful life.
3. Milky coloured water is generally air in suspension and will disperse of its own accord. In very hard water areas where anode gassing occurs, milky water may be evident. The use of a blue anode should overcome this problem.

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Hot water plumbing leaks

If hot water has not been used for a period of time, feeling the temperature of the hot water line may give an indication of water flow if the pipe is warm. The method of checking for plumbing leaks is:

1. Turn off the stopcock on the cold water supply to the water heater.
2. Open a hot tap to ensure the flow of water stops. This will confirm the stopcock is operating correctly.
3. Turn off the hot tap.
4. Turn on the stopcock to make up the water pressure in the cylinder, and then turn the stopcock off again.
5. Wait approximately 5 minutes then do either of the following:
    a. With your ear close to the stopcock turn it on slightly and listen for any water passing. If there are no leaks, water should not pass.
    b. Open a hot tap while listening for any pressure release. If there is a pressure release there will be no leaks in the plumbing system.

Mixing or crossed connections

If an automatic dishwasher, washing machine, flick mixer tap, tempering valve or thermostatic mixing valve is installed there is always the possibility that the cold water could mix with the hot water through a faulty or incorrectly installed valve.

This is referred to as a cross connection. The complaints of insufficient hot water, water too cold or excessive discharge from the T&PR valve may be attributed to a cross connection. The method of checking for a cross connection is:

1. Turn off the stopcock on the cold water supply to the water heater.
2. Open a hot tap. If water flow is persistent and cold a cross connection exists.

Manifolding - Headers

Very often complaints surrounding insufficient hot water in commercial installations can be attributed to poor manifolding.

In order for the water heaters to operate simultaneously the water flow through all the cylinders must be the same to ensure the temperature drop is equal.

In a worst-case scenario it is possible for 2 or 3 of the water heaters in a bank to almost never operate.

This results in an overall loss of heat input to the water moving through the building and can be confused as the installation being undersized or a malfunction of the water heaters.

The principle of Equa-Flow is to ensure the demand on each water heater in the bank is the same as any other. To achieve this, the following are necessary:

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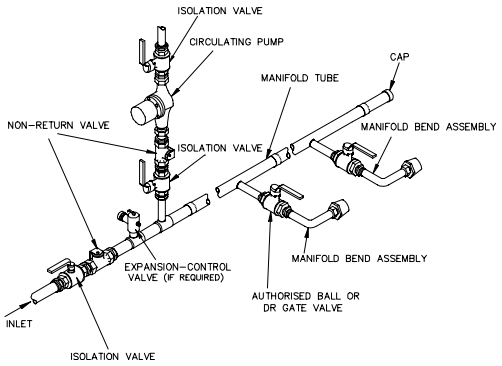
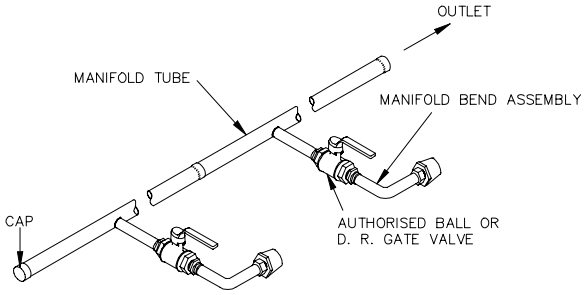
1. The **cold** water manifold must be designed to balance the flow to each unit i.e. each branch line must be the same diameter and length and be fitted with identical ball or gate valves.



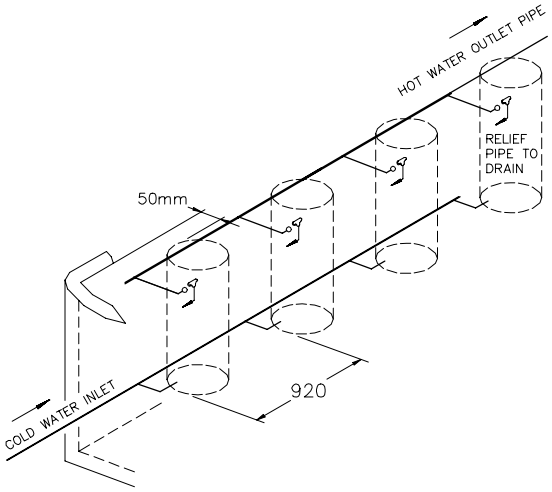
2. The **hot** water manifold must be designed to balance the flow from each unit i.e. each branch line must be the same diameter and length and be fitted with identical ball or gate valves.



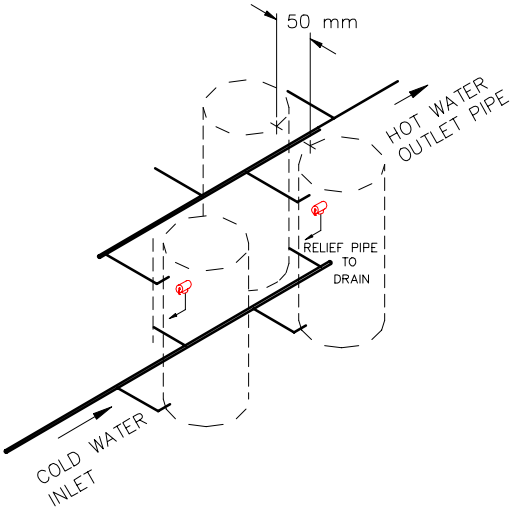
Manifolding - Types

1. All the water heaters must be of the same size and capacity.
2. The first heater supplied from the cold (inlet) manifold must be the last heater supplying the hot (outlet) manifold (refer to examples opposite and below).

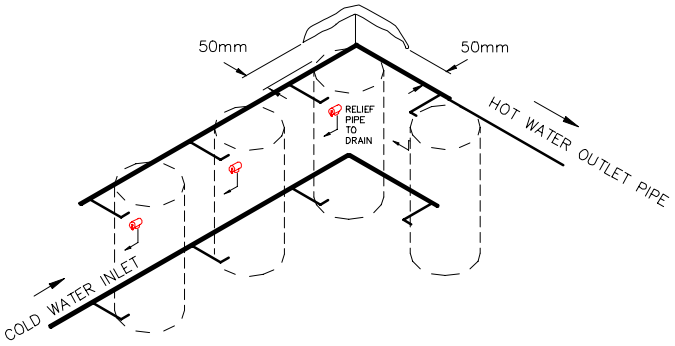
In Line Manifold



Back to Back Manifold



Angle Manifold



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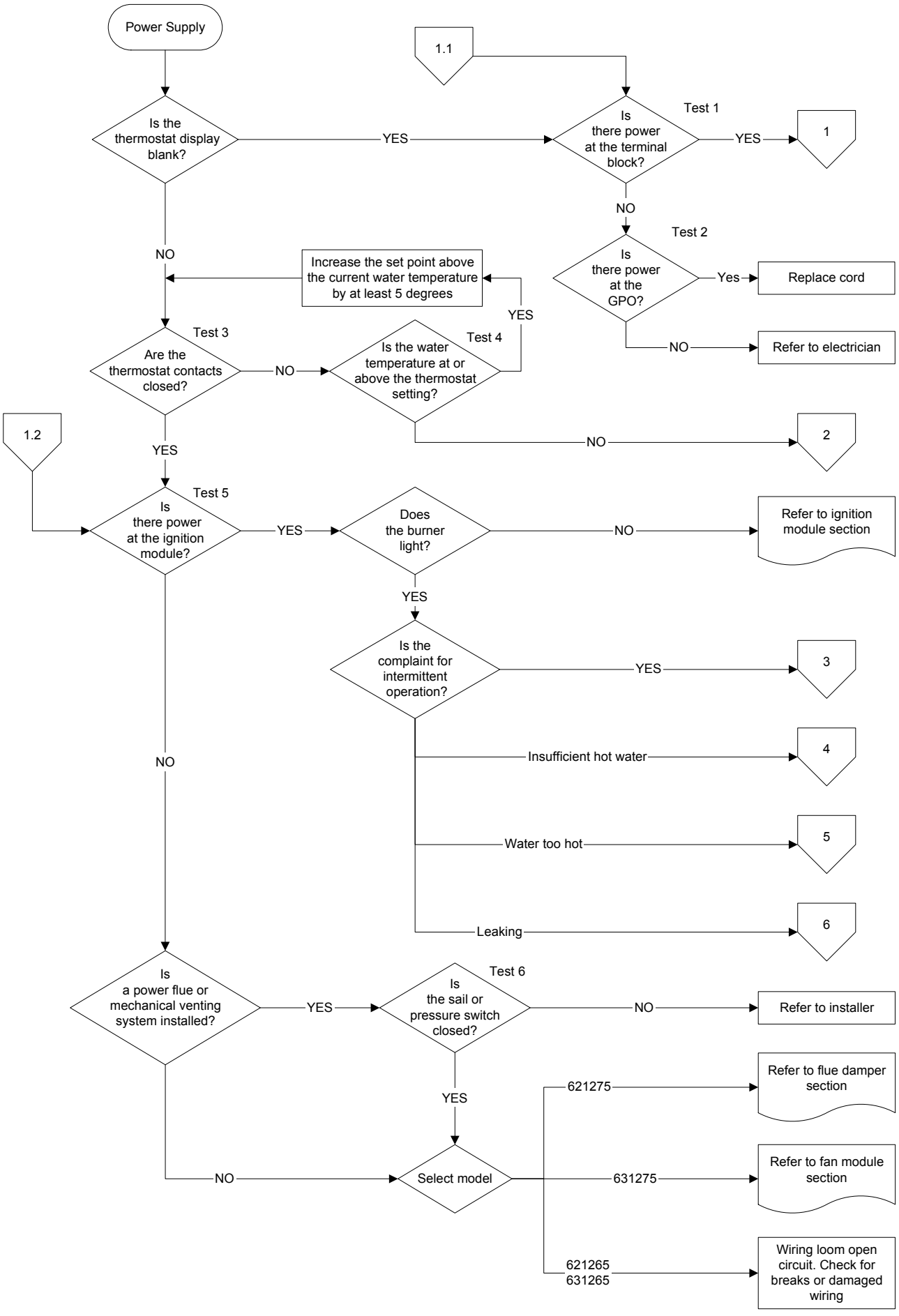
Fault Finding - Chart 1



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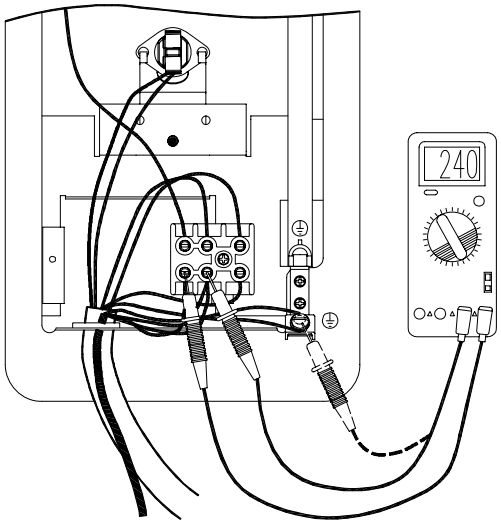
Test 1

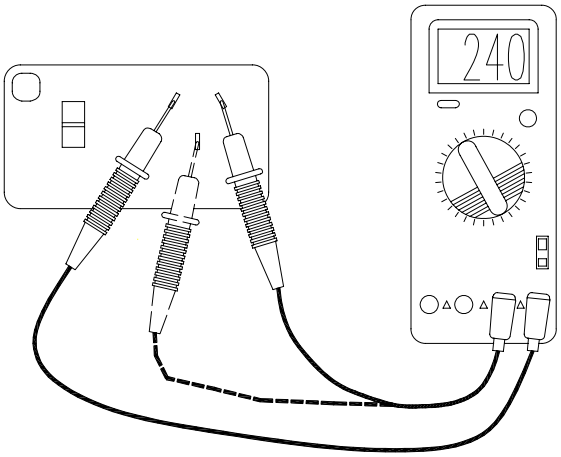


Components will be "live". Personal Protective Equipment should be worn when conducting these tests.

Using a multimeter set on the AC volts scale, measure between active and neutral and active and earth on the terminal block.

Normal voltage is AC240 volts. If either test fails a polarity or wiring problem exists.

Test 2

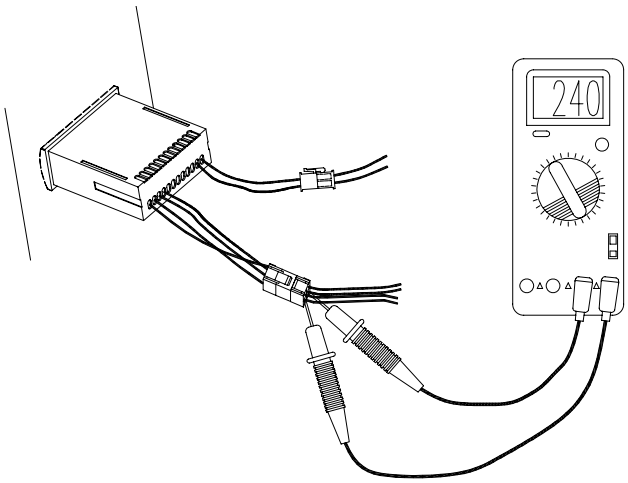


Components will be "live". Personal Protective Equipment should be worn when conducting these tests.

Using a multimeter set on the AC volts scale, unplug the 3-pin plug from the GPO and measure between the active and neutral pins and between the active and earth pins of the GPO.

Normal voltage is AC240 volts. If either test fails a polarity or wiring problem exists.

Test 3



Components will be "live". Personal Protective Equipment should be worn when conducting this test.

Note: On outdoor models the rain shield should be removed while conducting this test.

Using a multimeter set on the AC volts scale, measure between terminal 1 (orange wire) and terminal 4 (blue wire) at the thermostat.

Normal voltage when thermostat contacts are closed is AC240 volts

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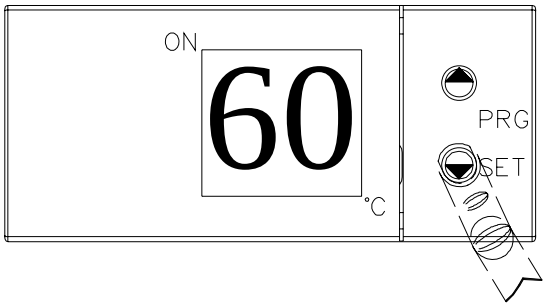
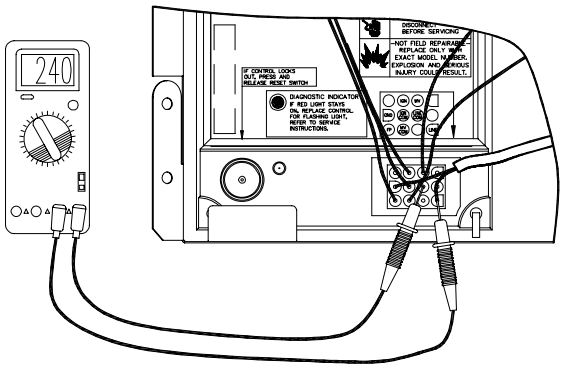


Test 4

Hot water capable of scalding may discharge from the T&PR valve drain. Personal Protective Clothing should be worn when conducting this test.

Press the down button on the thermostat for 5 seconds the current 'set point' temperature will be displayed. Using a thermometer measure the water temperature at the T&PR valve drain.

If the measured temperature is equal to or greater than the set point there will not be a call for heat

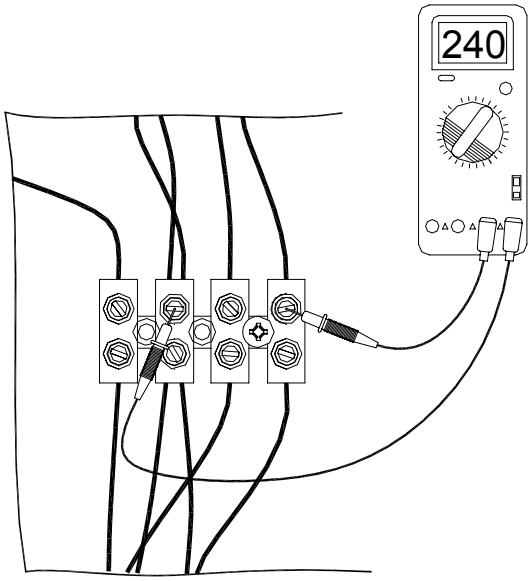


Test 5

Components will be "live". Personal Protective Equipment should be worn when conducting this test.

Using a multimeter set on the AC volts scale, measure between the orange wire ("LINE") and the blue wire ("LINE COM") on the ignition module.

Normal voltage is AC240 volts.



Test 6

Components will be "live". Personal Protective Equipment should be worn when conducting this test.

NOTE:
The thermostat must be calling for heat and the flue or mechanical ventilation fan operating to conduct this test. (Refer to test 3)

Using a multimeter set on the AC volts scale, measure between the switch wire from the pressure or sail switch and neutral on the terminal block

Normal voltage is AC240 volts.

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Fault Finding - Chart 2

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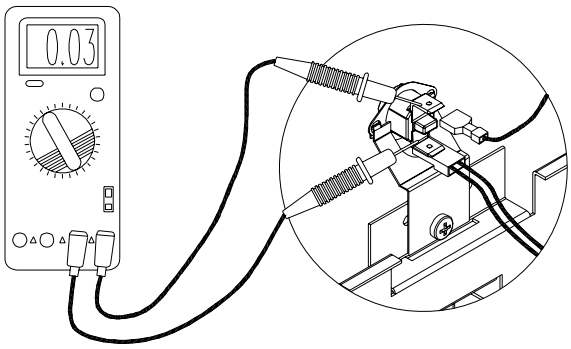
Test 7

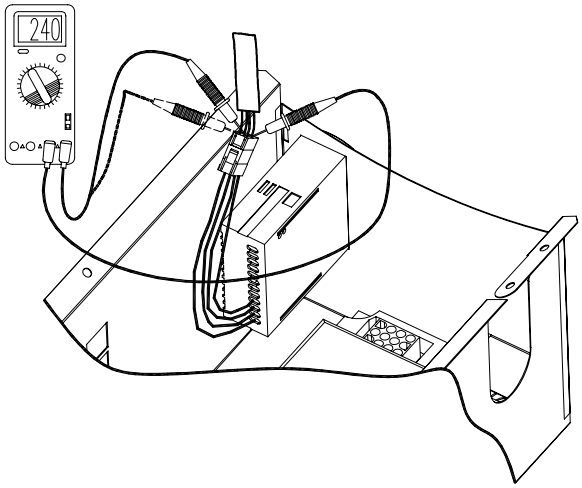


Ensure power is isolated prior to conducting this test.

Using a multimeter set on the x1 scale, measure across the terminals of the over temperature cut out.

Normal resistance should be less than 1 ohm.

Test 8



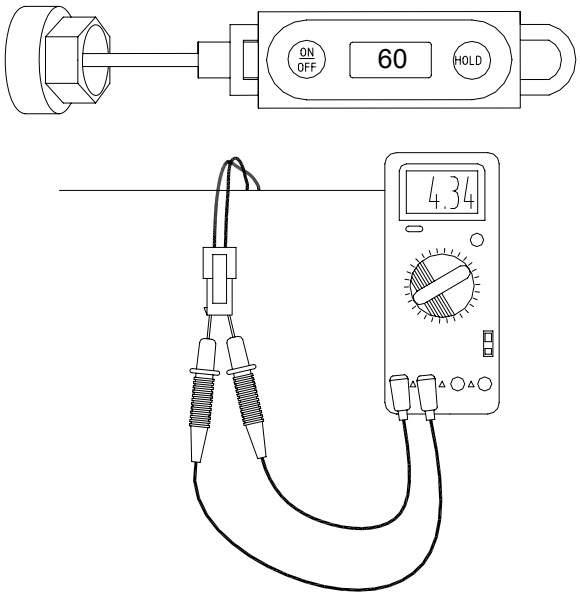
Indoor model shown

Components will be "live". Personal Protective Equipment should be worn when conducting this test.

Using a multimeter set on the AC volts scale, measure between terminal 2 (red wire) and terminal 4 (blue wire) and terminal 3 (red wire) and terminal 4 (blue wire) of the thermostat.

Normal voltage for both tests is AC240 volts.

Test 9



Ensure power is isolated prior to conducting this test.

Remove the hot and cold sensors from the probes and using a thermometer measure and note the temperature inside each probe.

Using the table and formula on page 29 calculate the resistance.

Reinsert the hot and cold sensors into the probes, wait 2 minutes then unplug the sensor set from the thermostat and using a multimeter set on x1000 resistance scale measure the resistance of the sensor set.

The measured value should be within 5% of the calculated value.

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Electronic Thermostat

The electronic thermostat has several parameters that control the water heater operation. Under normal conditions, including a power outage, these settings do not require adjustment, however following a thermostat replacement or if the delivered water temperature deviates significantly from that displayed on the thermostat, the settings should be checked and may require adjustment.

Thermostat Parameters

Parameter	Description	Range	
		MIN	MAX
C0	**Temperature Probe Calibration (Offset)** Temperature increase or decrease added to the temperature detected (displayed) to adjust the temperature probe to the actual value.	-20ºC	+20ºC
C1	**Differential** Temperature decrease from the thermostat "set point" required before the thermostat contacts close to initiate the heating cycle.	1ºC	20ºC
C2	**Maximum "Set Point" Limiter** The "set point" cannot be adjusted above this value, with the "AH" (alarm high) temperature alarm activated if the detected temperature rises above this value.	xxºC	82ºC
C3	**Minimum "Set Point" Limiter** The "set point" cannot be adjusted below this value, with the "AL" (alarm low) temperature alarm activated if the detected temperature falls below this value.	-50ºC	xxºC
P0	**Type of operation (Heat/Cool)** Selects the thermostat operation for cooling or heating applications 0 = Cooling (Differential above the "set point") 1 = Heating (Differential below the "set point")	0	1
P2	**Block Programmed Parameters** Prevents parameters from being altered 0 = No (Parameters can be altered) 1 = Yes (Parameters cannot be altered)	0	1
EP	**Exit Programming** Locks in changes made to parameters.	-	-

The electronic thermostat features several other parameters that are not utilized by the heavy-duty gas models; these must not be altered from the existing settings.

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Electronic Thermostat Diagnosis

In the event a fault occurs either internally or externally a 2-digit code will be displayed on the thermostat LED to indicate the fault.

Code	Fault	Possible Cause
AL	Temperature below the minimum set point parameter C3	Ignition module in “wait” or “lock out” mode Gas supply failure Ancillary equipment failure i.e. power flue
AH	Temperature above the maximum set point parameter C2	Burner not shutting down Stacking Thermostat incorrectly programmed Circulator not fitted for 82º setting
EE	Memory error	Replace thermostat
E1	Temperature sensor set open circuit	Replace sensor set

Electronic Thermostat Adjustment

Thermostat Parameters

The table below details the parameter settings for the thermostat set point. These parameters **MUST** be set correctly for the water heater to operate properly.

Temperature	**Parameter**				
“Set Point”	(C0)	(C1)	(C2)	(C3)	(P0)
60 - 64	14	2	80	55	1
65 - 69	15	2	80	60	1
70 - 74	16	2	80	65	1
75 - 79	17	2	85	70	1
80 - 81	18	2	85	75	1
82 (Recirculation required)	18	2	85	75	1

Note: During the programming process if a button is not pressed for 25 seconds or the programme is not exited via the EP parameter the thermostat will revert to the temperature display without modifying the program. It will be necessary to reprogram the thermostat again should this occur.

Adjusting the Water Temperature

When adjusting the thermostat setting (‘set point’) it will also be necessary to alter the offset. The table opposite outlines the thermostat temperature and the corresponding offset.

Failure to adjust the offset will result in incorrect outlet water temperature.

Temperature ºC	Offset (C0)
60 – 64	14
65 – 69	15
70 – 74	16
75 – 79	17
80 – 81	18
82 **(Recirculation required)**	18

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To adjust the thermostat setting and offset

1. Press the “down” button for 5 seconds. The current set point temperature will be displayed. Release the button.
2. Press the “down” button to decrease the set point or the “up” button to increase the set point.
3. Once the required temperature is selected, press and hold the “down” button and the “up” button simultaneously. The display will revert to the current water temperature in the water heater.
4. Press and hold the “down” button and the “up” button simultaneously for 10 seconds, “C0” (offset program) will be displayed. Release the buttons.
5. Press and hold the “down” button and the “up” button simultaneously again. The current setting for “C0” will be displayed. Release the buttons.
6. Press the “down” button to decrease the setting or the “up” button to increase the setting according to the table above i.e. if the temperature set in step three is 60 then the offset value must be 14 (refer to table on page 25).
7. Once the required offset is selected press and hold the “down” button and the “up” button simultaneously, “C0” will be displayed.
8. Press the “down” button once; “EP” (exit program) will be displayed.
9. Press and hold the “down” button and the “up” button simultaneously; the current water temperature in the water heater will now be displayed and programming complete.

To adjust the differential

1. Press and hold the “down” button and the “up” button simultaneously for 10 seconds, “C0” (offset program) will be displayed. Release the buttons.
2. Press the “up button once, “C1” is displayed.
3. Press and hold the “down” button and the “up” button simultaneously again. The current setting for “C1” will be displayed. Release the buttons.
4. Press the “down” button to decrease the setting or the “up” button to increase the setting according to the table on page 25 i.e. for a set temperature of 60 then the differential value is 2.
5. Once the required differential is selected press and hold the “down” button and the “up” button simultaneously, “C1” will be displayed.
6. Press the “down” button twice; “EP” (exit program) will be displayed.
7. Press and hold the “down” button and the “up” button simultaneously; the current water temperature in the water heater will now be displayed and programming complete.

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To adjust the maximum set point

1. Press and hold the “down” button and the “up” button simultaneously for 10 seconds, “C0” (offset program) will be displayed. Release the buttons.
2. Press the “up button until “C2” is displayed.
3. Press and hold the “down” button and the “up” button simultaneously again. The current setting for “C2” will be displayed. Release the buttons.
4. Press the “down” button to decrease the setting or the “up” button to increase the setting according to the table on page 25 i.e. for a set temperature of 60 then the maximum set point value is 80.
5. Once the required maximum set point is selected press and hold the “down” button and the “up” button simultaneously, “C2” will be displayed.
6. Press the “down” button until “EP” (exit program) is displayed.
7. Press and hold the “down” button and the “up” button simultaneously; the current water temperature in the water heater will now be displayed and programming complete.

To adjust the “minimum set point”

1. Press and hold the “down” button and the “up” button simultaneously for 10 seconds, “C0” (offset program) will be displayed. Release the buttons.
2. Press the “up button until “C3” is displayed.
3. Press and hold the “down” button and the “up” button simultaneously again. The current setting for “C3” will be displayed. Release the buttons.
4. Press the “down” button to decrease the setting or the “up” button to increase the setting according to the table on page 25, i.e. for a set temperature of 60 then the minimum set point value is 55.
5. Once the required minimum set point is selected press and hold the “down” button and the “up” button simultaneously, “C3” will be displayed.
6. Press the “down” button until “EP” (exit program) is displayed.
7. Press and hold the “down” button and the “up” button simultaneously; the current water temperature in the water heater will now be displayed and programming complete.

To adjust the “type of operation”

1. Press and hold the “down” button and the “up” button simultaneously for 10 seconds, “C0” (offset program) will be displayed. Release the buttons.
2. Press the “up button until “P0” is displayed.
3. Press and hold the “down” button and the “up” button simultaneously again. The current setting for “P0” will be displayed. Release the buttons.
4. Press the “down” button or the “up” button to change the setting. The type of operation **must be** set to 1.
5. Press and hold the “down” button and the “up” button simultaneously, “P0” will be displayed.
6. Press the “down” button until “EP” (exit program) is displayed.
7. Press and hold the “down” button and the “up” button simultaneously; the current water temperature in the water heater will now be displayed and programming complete.

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To unblock parameters

1. Press and hold the “down” button and the “up” button simultaneously for 10 seconds, “C0” (offset program) will be displayed. Release the buttons.
2. Press the “up button until “P2” is displayed.
3. Press and hold the “down” button and the “up” button simultaneously again. The current setting for “P2” will be displayed. Release the buttons.
4. Press the “down” button or the “up” button to change the setting. In order to be able to adjust parameters “P2” **must** be set to 0.
5. Press and hold the “down” button and the “up” button simultaneously, “P2” will be displayed.
6. Press the “down” button until “EP” (exit program) is displayed.
7. Press and hold the “down” button and the “up” button simultaneously; the current water temperature in the water heater will now be displayed and programming complete.

Temperature variation

In some cases the actual water temperature may vary from that displayed on the thermostat despite the parameters being correctly programmed. This is most likely to occur in recirculated systems.

In order to check the actual tank water temperature, the measurement:

1. **Must** be taken at the T & PR valve drain line.
2. The burner **must** be off for at least 5 minutes before the temperature measurement is taken.
3. Water should not be drawn from the system.

If the temperature deviates from that displayed on the thermostat by more than 2 degrees it will be necessary to custom set the offset parameter.

When reprogramming the offset parameter (C0) it will be necessary to take into account the current “offset” already programmed into the thermostat.

For example if the current “set point” is 70 then the offset should currently be set at 16. If the displayed temperature is 70ºC but the actual measured water temperature is 75ºC then the offset will need to be increased by 5 (the difference between the displayed temperature and the measured temperature) from 16 to 21, **not set at 5**.

The same principal applies if the thermostat is reading high. Using the example above if the measured water temperature was 65ºC then the offset will need to be decreased by 5 (the difference between the displayed temperature and the measured temperature) from 16 to 11, **not set at –5**.

NOTE: Where the displayed water temperature is 10 or more degrees BELOW the measured water temperature and the thermostat offset is programmed correctly for the set point, conduct a sensor resistance test (refer to test 9). If the sensor set is faulty do NOT attempt to overcome the difference by adjusting the thermostat offset, replace the sensor set.

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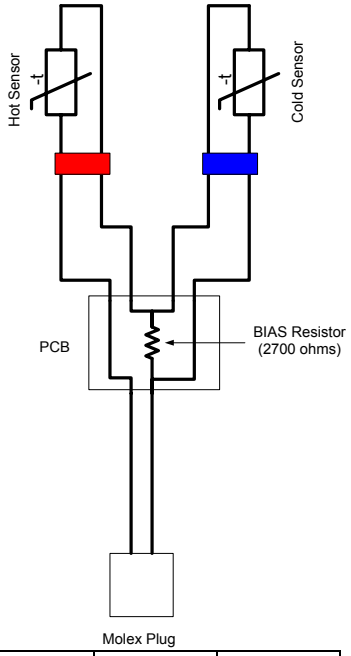
Temperature Sensor Set

The temperature sensor set consists of 2 NTC (negative temperature coefficient) thermistors, which form the hot and cold sensors.



In order to achieve the average water temperature in the cylinder the cold sensor has an additional resistor connected in parallel to it (refer to the circuit diagram opposite), this resistor is mounted on a small circuit board insulated into the sensor wiring loom.

It is critical that the cold sensor (designated by BLUE heat shrink on the wiring) is always installed in the lower sensor pocket and the hot sensor (designated by RED heat shrink on the wiring) is always mounted in the top sensor pocket. Failure to do so will cause the heater to malfunction.

Sensor Resistance

In order to calculate the overall resistance of the sensor set it will be necessary to measure the temperature in the hot and cold sensor probes using a thermometer and then using the table opposite (applies to both sensors) and formula below, calculate the resistance.

ºC	Ohms	ºC	Ohms	ºC	Ohms
0	27280	35	6941	70	2229
5	22050	40	5828	75	1924
10	17960	45	4912	80	1669
15	14680	50	4161	85	1451
20	12090	55	3537	90	1266
25	10000	60	3021	95	1108
30	8313	65	2589	100	973

$$\text{Sensor set resistance} = \left(\frac{R1 \times R3}{R1 + R3}\right) + R2$$

Where:
R1 = cold sensor resistance, R2 = hot sensor resistance & R3 = Bias resistor (2700 ohms)

Example:

The measured temperature of the cold sensor pocket is 60 degrees and the hot sensor pocket is 70 degrees. From the table above the resistances for each sensor are 3021 ohms and 2229 ohms respectively, therefore

$$\text{Sensor set resistance} = \left(\frac{3021 \times 2700}{3021 + 2700}\right) + 2229$$

$$\text{Sensor set resistance} = \left(\frac{8156700}{5721}\right) + 2229$$

Sensor set resistance = 1425.75 + 2229 = **3654.75 ohms**

Sensor Fault Conditions

Symptom	Possible Cause	Remedy
Thermostat displays E1	Hot sensor open circuit	Replace Sensor Set
Thermostat displays AH 88	Hot sensor short circuited	
Thermostat reads low	Cold sensor open circuit	
Thermostat reads high	Cold sensor short circuited	

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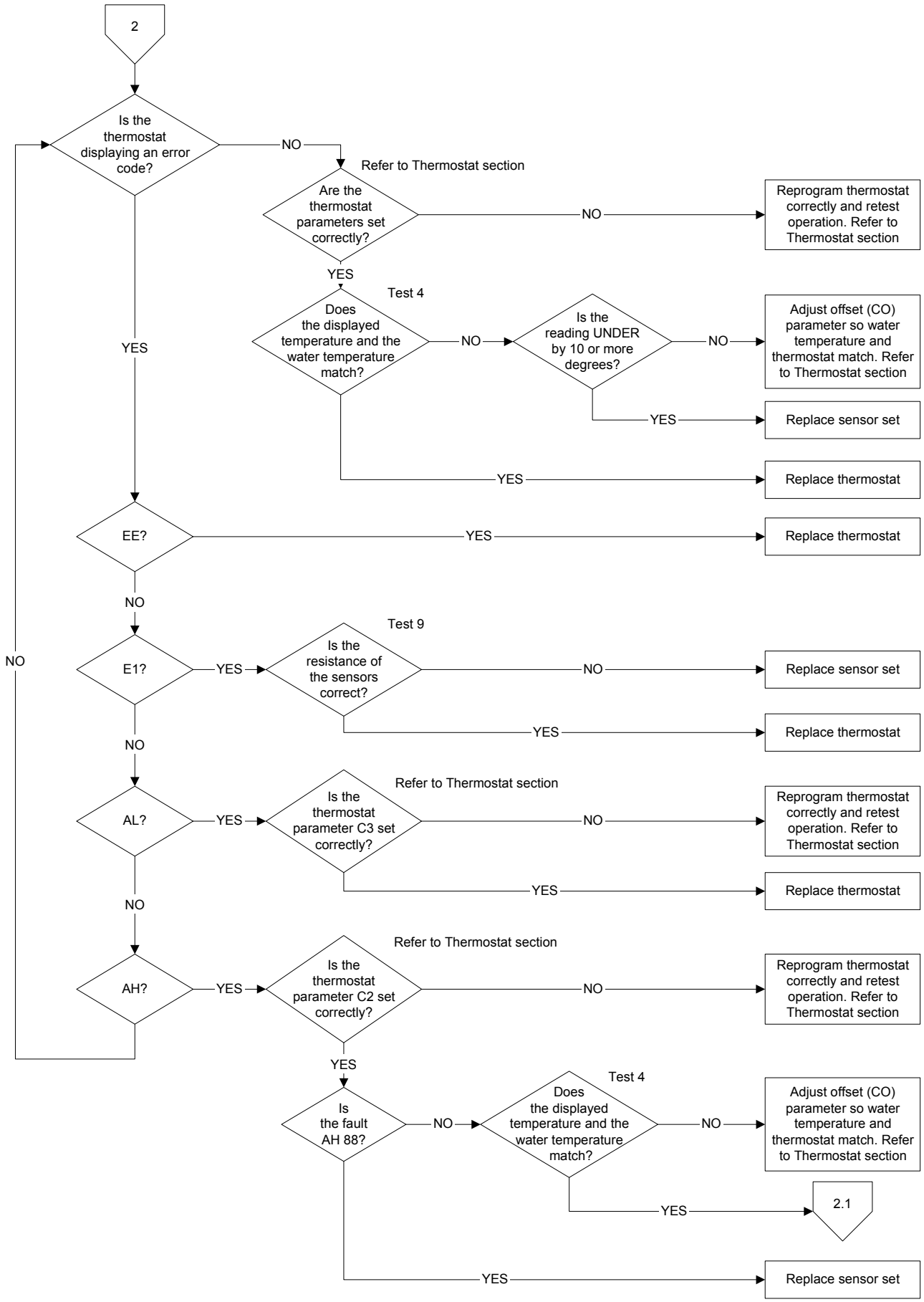
Fault Finding – Chart 3



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Ignition Module

The ignition module continuously performs a self-check routine. Any time a fault is detected, internally or externally the module will enter either a “wait” mode or a “lock out” mode depending on the fault detected.

An LED indicator light on the ignition module will emit a series of flashes to indicate the fault. The LED will flash on for approximately ¼ second and off for approximately ¼ second. A 2 second delay occurs between each group of flashes.

The LED will stay on continuously for approximately 1 second when power is turned on. With the exception of ignition retry lockout (1 flash) the ignition module will automatically reset if the fault clears or is rectified (repaired). Ignition retry “lockout” requires a manual reset to be performed.

Fault Codes

Flashes	Fault	Possible Cause	Action
1	Ignition retry lockout	Gas failure Low gas pressure Failed gas valve	Rectify fault and manually reset ignition module
2*	Pressure switch not open	Faulty pressure switch	Auto reset when fault is rectified
3*	Pressure switch not closed	Faulty fan Faulty pressure switch	
4	Faulty igniter / igniter sensing circuit	Faulty igniter Poor connection in multi-pin plug Power spike	
5	Flame detected with gas valve de-energised	Failed ignition control module Failed gas valve	
6	Reversed polarity	Active and Neutral reversed	
7	Flame sense circuit failure	AC leakage > than 6.5µA High resistance to earth Moisture Low gas pressure	

* Fault code only available on ignition module 50A72-178 utilised in 631275 models manufactured after 09/02/05.

Flashes	Fault	Action
Steady	Module failure or event counter limit exceeded	Reset the module, if the LED remains steady replace module

- If the module resets the event counter has been exceeded indicating there is a fault with the heater or the installation i.e. low gas pressure.

Flashes	Fault	Cause
Rapid flash	Frequency check failure	Poor supply frequency

- Check for large contactors, relays or electronic speed controllers in the plant room.

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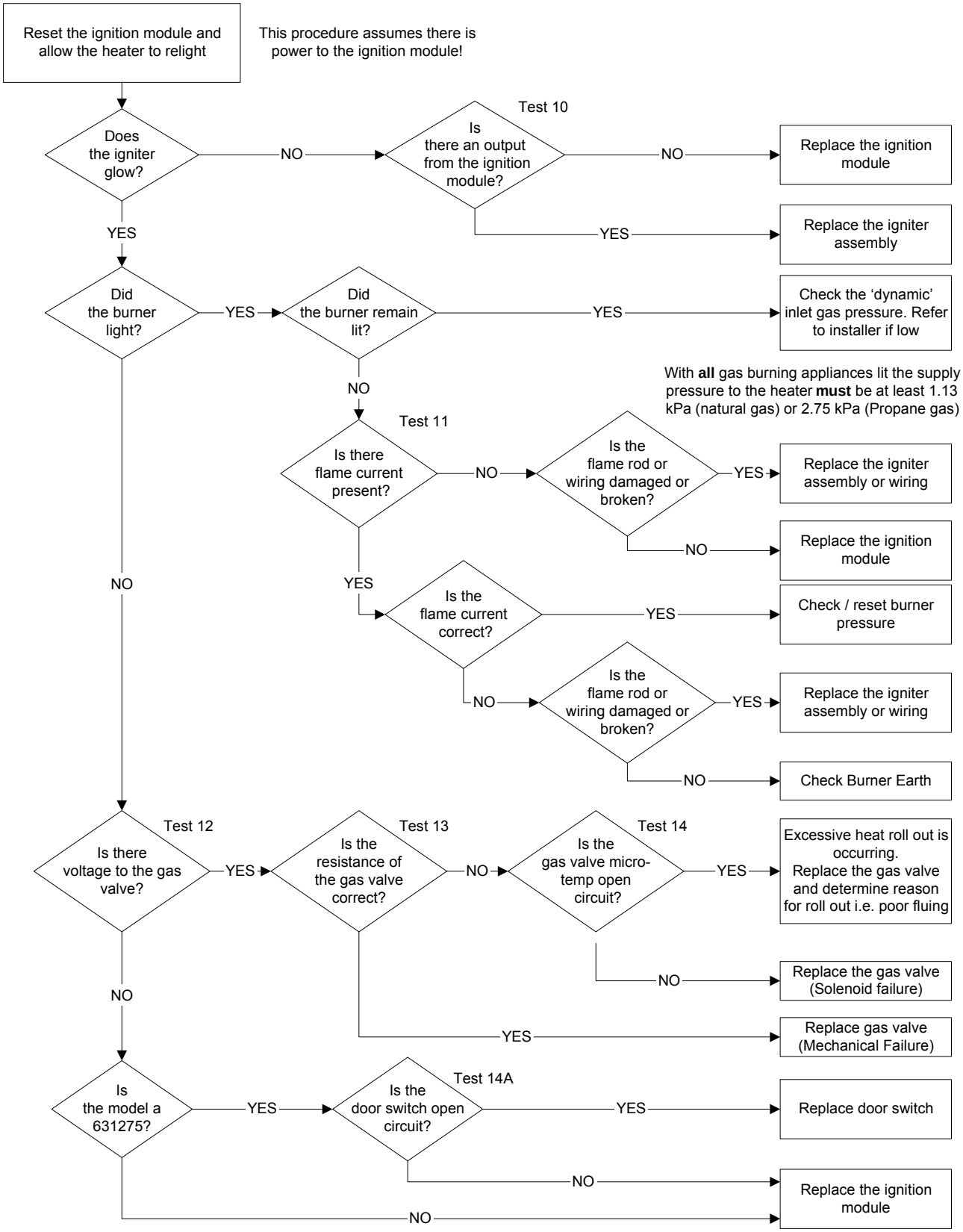
1 Flash (Retry lockout) - Chart 4

This fault occurs if flame is not sensed after the fourth ignition attempt and is most commonly caused by insufficient gas pressure.


Reset the ignition module and allow the heater to relight
This procedure assumes there is power to the ignition module!
Does the igniter glow?
NO
Test 10
Is there an output from the ignition module?
NO
Replace the ignition module
YES
Replace the igniter assembly
YES
Did the burner light?
YES
Did the burner remain lit?
YES
Check the 'dynamic' inlet gas pressure. Refer to installer if low
With all gas burning appliances lit the supply pressure to the heater must be at least 1.13 kPa (natural gas) or 2.75 kPa (Propane gas)
NO
Test 11
Is there flame current present?
NO
Is the flame rod or wiring damaged or broken?
YES
Replace the igniter assembly or wiring
NO
Replace the ignition module
YES
Is the flame current correct?
YES
Check / reset burner pressure
NO
Is the flame rod or wiring damaged or broken?
YES
Replace the igniter assembly or wiring
NO
Check Burner Earth
NO
Test 12
Is there voltage to the gas valve?
YES
Test 13
Is the resistance of the gas valve correct?
NO
Test 14
Is the gas valve micro-temp open circuit?
YES
Excessive heat roll out is occurring. Replace the gas valve and determine reason for roll out i.e. poor fluing
NO
Replace the gas valve (Solenoid failure)
YES
Replace gas valve (Mechanical Failure)
NO
Is the model a 631275?
YES
Test 14A
Is the door switch open circuit?
YES
Replace door switch
NO
Replace the ignition module
NO

NOTE: Micro-temp failure is due to excessive heat roll out from the combustion chamber. Common causes are blocked or restricted primary flue, undersized, blocked or restricted secondary fluing or a flue cowl terminating in a pressurized zone (refer to page 56).

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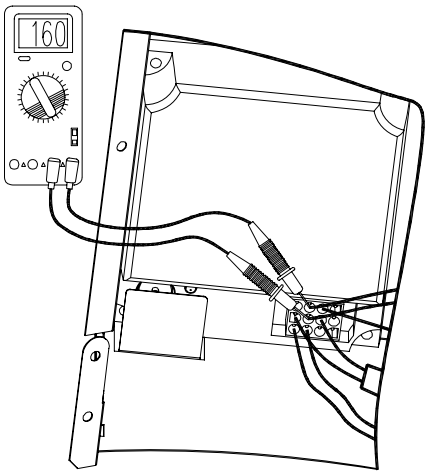
Test 10

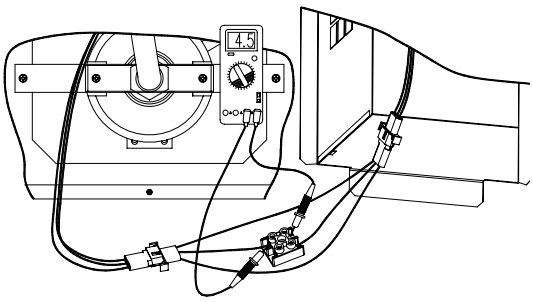


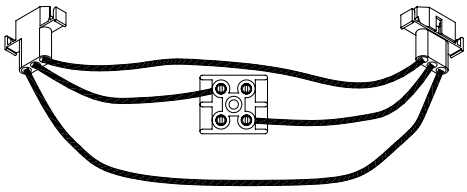
Components will be "live". Personal Protective Equipment should be worn we conducting these tests.

During the ignition trial period using a multimeter set on the AC volts scale, measure between the orange wire ("IGN") and the red wire ("IGN COM") terminals on the ignition module.

The voltage should be between AC140 and 200 volts.

Test 11





Components will be "live". Personal Protective Equipment should be worn we conducting these tests.

The use of flame current test loom part number 890284 will assist in conducting this test.

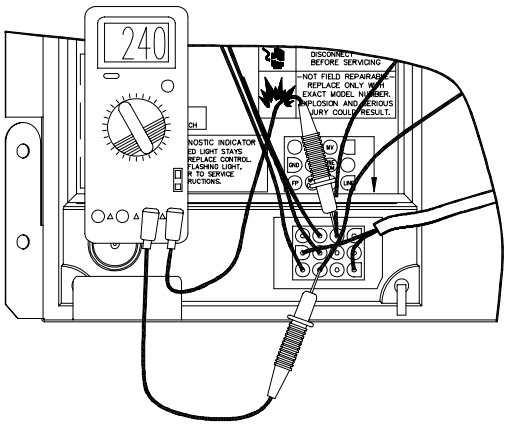
1. Using a multimeter set on the AC micro-amps scale and wired in series with the flame rod circuit, measure the flame current.

   A current up to but not exceeding AC10 micro-amps may be detected while flame is established.

2. Set the multimeter to the DC micro-amps scale.

A current of approx. DC4.5 micro-amps should be detected while flame is established.

Test 12



Components will be "live". Personal Protective Equipment should be worn when conducting this test.

Using a multimeter set on the AC volts scale, measure between the brown wire ("MV") and the blue wire ("MV COM") on the ignition module while the heater is attempting to light.

Normal voltage from the ignition module is AC240 volts.

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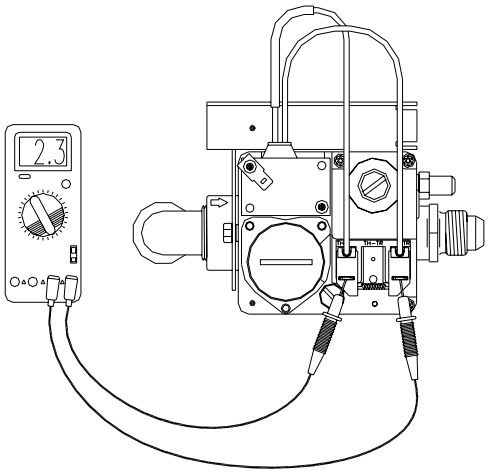
Test 13



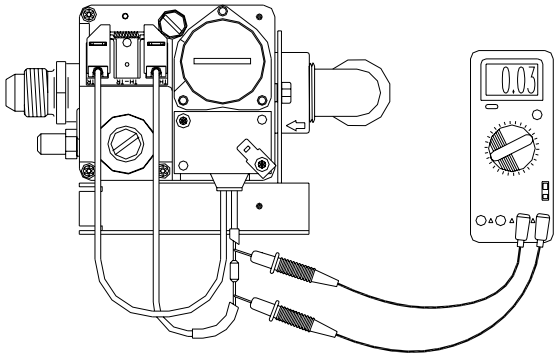
Isolate power before conducting this test.

Using a multimeter set on the x20K resistance scale, measure across the gas valve terminals.

Normal resistance should be approximately 2.3 kilo-ohms.

A reading of approx 3.1 kilo-ohms indicates the internal solenoid has failed.
A reading of approx. 8.7 kilo-ohms indicates the external solenoid has failed

Test 14



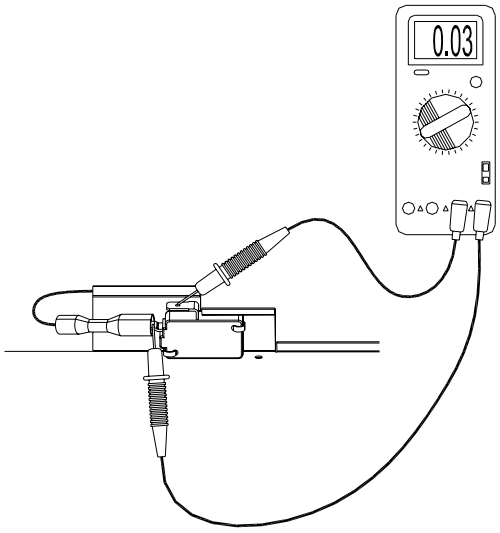
Isolate power before conducting this test.

Note: It will be necessary to strip a small portion of the heat shrink off the gas valve wiring to access the micro-temp.

Using a multimeter set on x1 resistance scale, measure across the micro-temp fitted in the gas valve wiring.

Normal resistance should be less than 1 ohm.

Test 14A



Isolate power before conducting this test.

Using a multimeter set on the x1 resistance scale, measure across the door switch terminals.

Normal resistance with the striker depressed should be less than 1 ohm.

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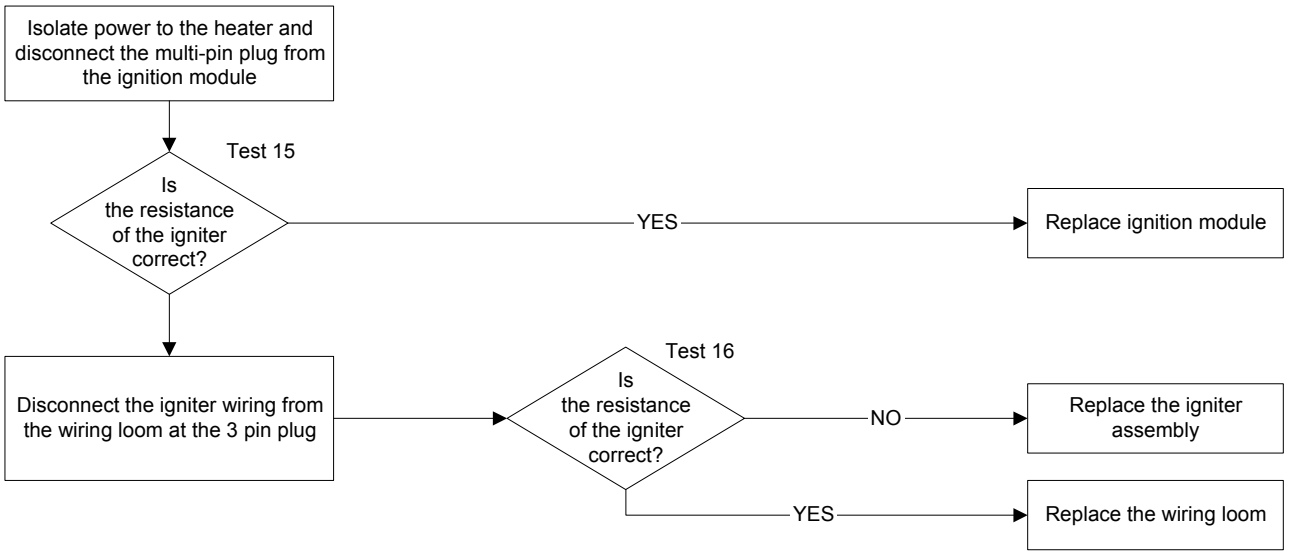
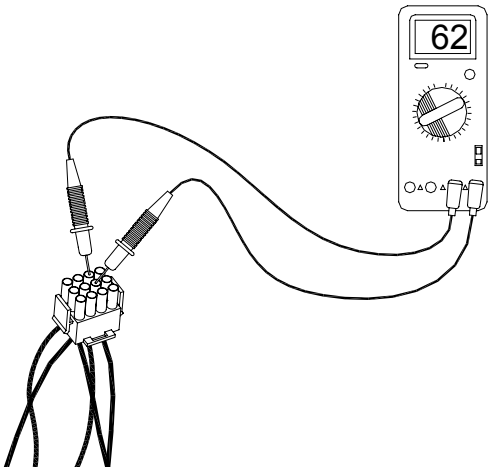
4 Flashes (Faulty igniter / Igniter sensing circuit) - Chart 5


Isolate power to the heater and disconnect the multi-pin plug from the ignition module
Test 15
Is the resistance of the igniter correct?
YES
Replace ignition module
Disconnect the igniter wiring from the wiring loom at the 3 pin plug
Test 16
Is the resistance of the igniter correct?
NO
Replace the igniter assembly
YES
Replace the wiring loom

Component Tests 15 - 16

Test 15

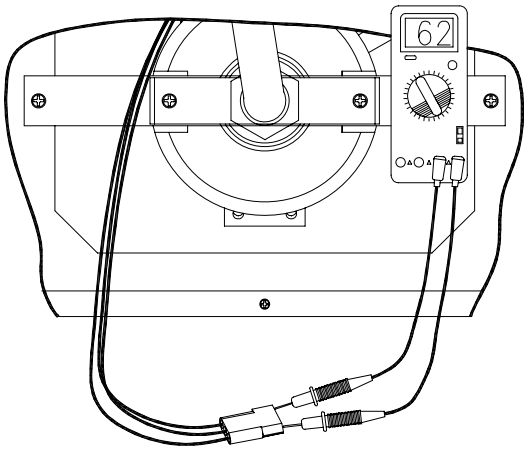


Isolate power before conducting this test.

Disconnect the wiring plug from the ignition module and using a multimeter set on the x1 resistance scale measure between the orange wire ("IGN") and the red wire ("IGN COM") of the wiring loom.

Normal resistance should be between 60 and 75 ohms when the igniter is cold.

Test 16



Isolate power before conducting this test.

Using a multimeter set on the x1 resistance scale disconnect the 3-pin wiring plug to the igniter/flame rod assembly and measure between the outer pins of the 3-pin connector.

Normal resistance should be between 60 and 75 ohms when the igniter is cold.

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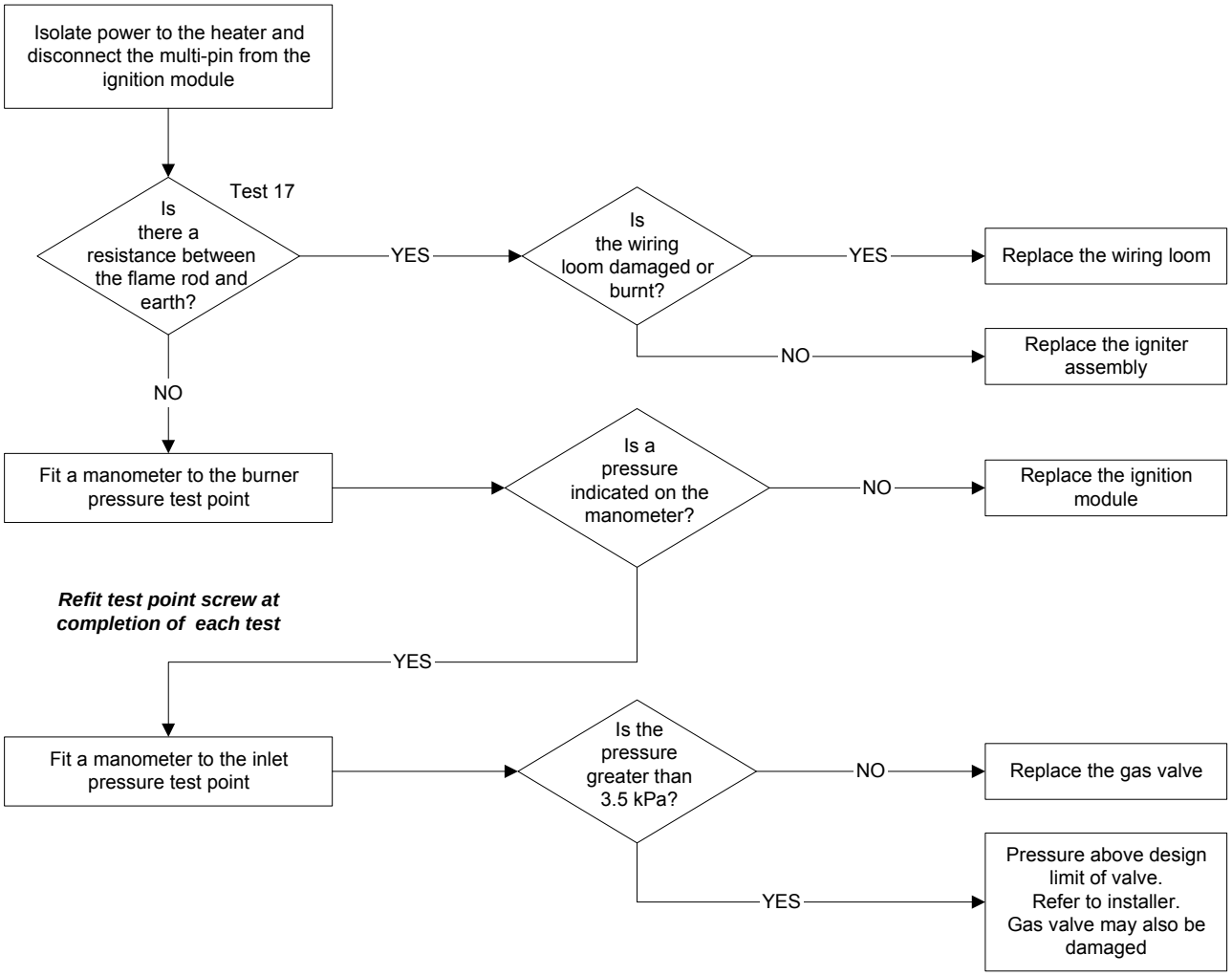
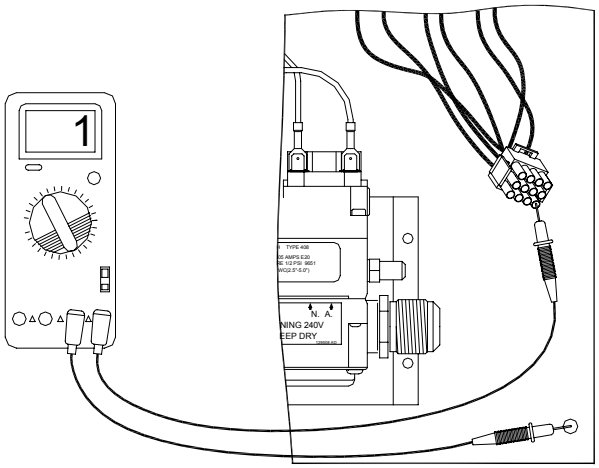
5 Flashes (Flame sensed with gas valve de-energised) - Chart 6


Isolate power to the heater and disconnect the multi-pin from the ignition module
Test 17
Is there a resistance between the flame rod and earth?
YES
Is the wiring loom damaged or burnt?
YES
Replace the wiring loom
NO
Replace the igniter assembly
NO
Fit a manometer to the burner pressure test point
Is a pressure indicated on the manometer?
NO
Replace the ignition module
Refit test point screw at completion of each test
YES
Fit a manometer to the inlet pressure test point
Is the pressure greater than 3.5 kPa?
NO
Replace the gas valve
YES
Pressure above design limit of valve. Refer to installer. Gas valve may also be damaged

Component Test 17

Test 17



Isolate power before conducting this test.

Using an insulation tester (Megger) set on the 500 volts scale, disconnect the wiring plug from the ignition module and conduct an insulation test between the blue wire ("FP") and earth.

Repeat the test from the 3-pin wiring plug to the igniter/flame rod assembly

Normal resistance should be infinity.

6 Flashes – Active and Neutral wiring reversed

- Check for incorrectly wired power point.
- Check for incorrectly wired extension lead.

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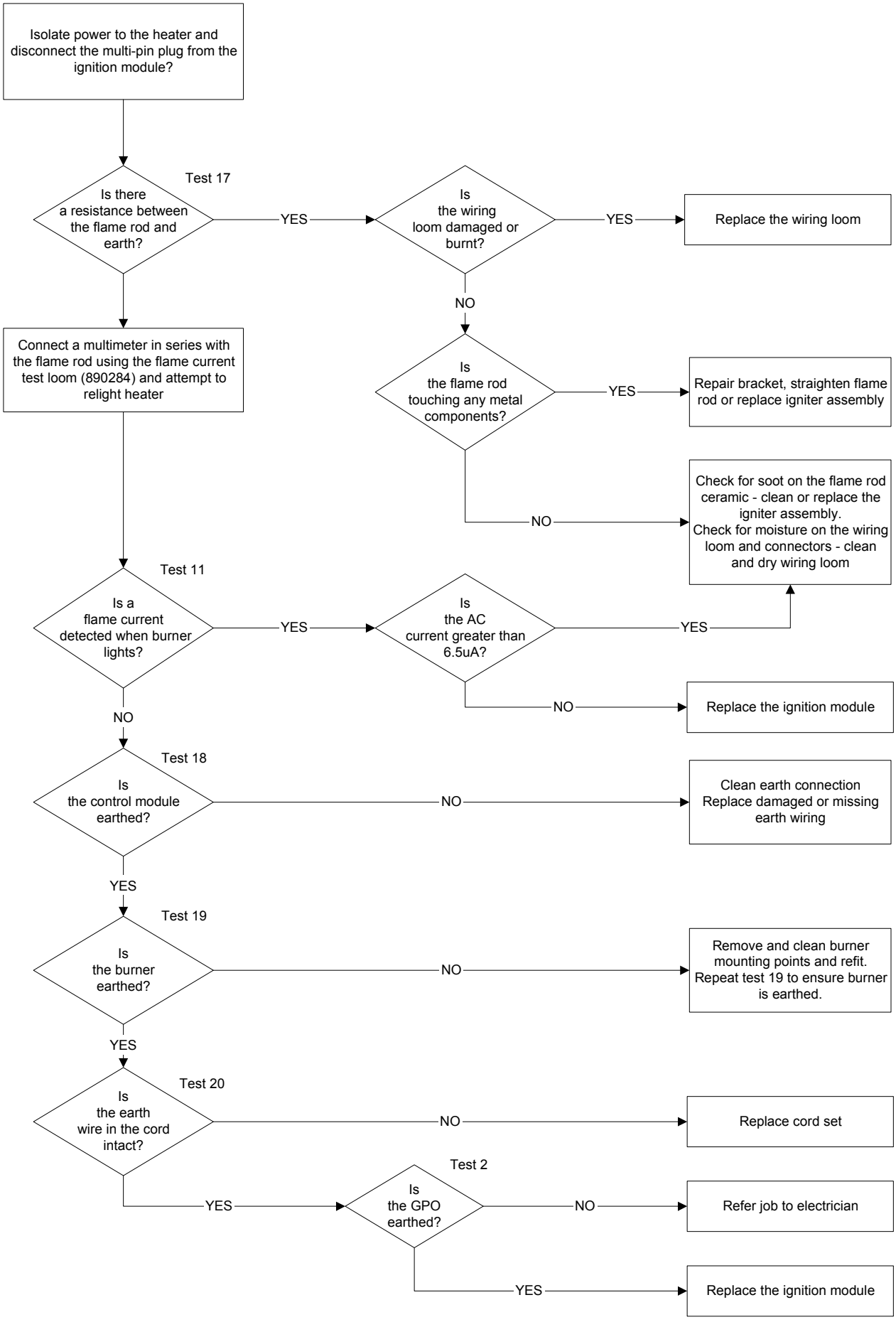
7 Flashes (Flame sense circuit failure) - Chart 7


Isolate power to the heater and disconnect the multi-pin plug from the ignition module?
Test 17
Is there a resistance between the flame rod and earth?
YES
Is the wiring loom damaged or burnt?
YES
Replace the wiring loom
NO
Connect a multimeter in series with the flame rod using the flame current test loom (890284) and attempt to relight heater
Is the flame rod touching any metal components?
YES
Repair bracket, straighten flame rod or replace igniter assembly
NO
Check for soot on the flame rod ceramic - clean or replace the igniter assembly.
Check for moisture on the wiring loom and connectors - clean and dry wiring loom
Test 11
Is a flame current detected when burner lights?
YES
Is the AC current greater than 6.5uA?
YES
NO
Replace the ignition module
NO
Test 18
Is the control module earthed?
NO
Clean earth connection
Replace damaged or missing earth wiring
YES
Test 19
Is the burner earthed?
NO
Remove and clean burner mounting points and refit.
Repeat test 19 to ensure burner is earthed.
YES
Test 20
Is the earth wire in the cord intact?
NO
Replace cord set
YES
Test 2
Is the GPO earthed?
NO
Refer job to electrician
YES
Replace the ignition module

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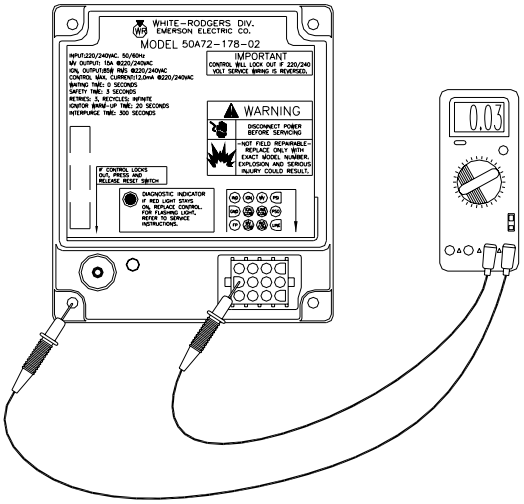
Test 18



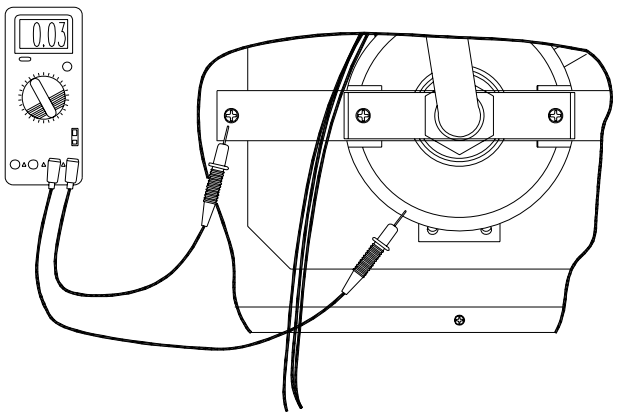
Note: Wiring and plug not shown for clarity

Isolate power before conducting this test

Using a multimeter set on the x1 resistance scale, measure between the green/yellow wire ("GND") on the ignition module and the base of the water heater.

Normal resistance should be less than 1 ohm.

Test 19



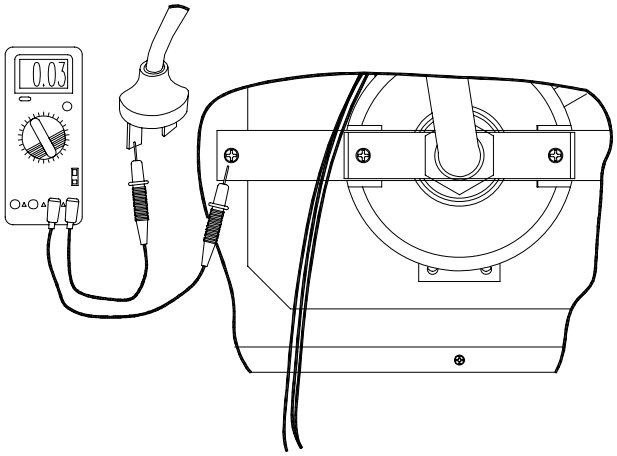
Isolate power before conducting this test

Using a multimeter set on the x1 resistance scale, measure between the burner and the base of the water heater.

Note: It may be necessary to clean a section of the burner to ensure continuity of the multimeter test lead probe.

Normal resistance should be less than 1 ohm.

Test 20



Isolate power before conducting this test

Remove the 3-pin plug from the GPO and using a multimeter set on the x1 resistance scale, measure between the earth pin of the cord set and the base of the water heater.

Normal resistance should be less than 0.5 ohms.

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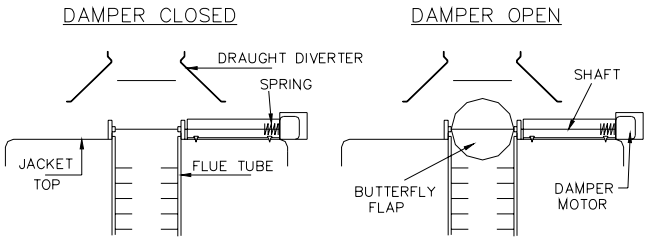
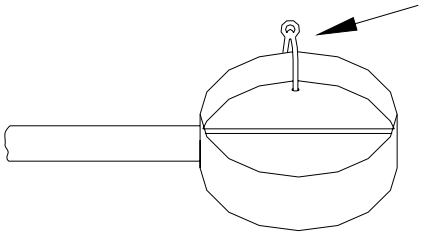
Flue Damper - 621275 ONLY

The flue damper is screwed to the jacket top of the water heater. The damper consists of an actuator and butterfly flap that controls the exit of flue gases from the primary flue into the draught diverter and secondary flue.

When the water heater is on standby the butterfly flap is closed to prevent the flow of air up the flue tube. When the burner is operating the butterfly flap is open, allowing the free flow of combustion products from the water heater to the draught diverter and into the secondary flue.



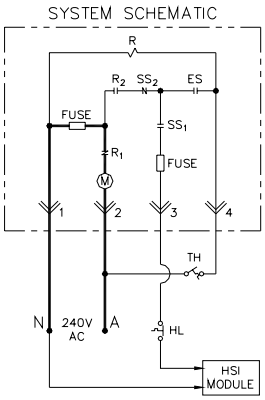


NOTE: The butterfly flap is secured in the closed position with a spring clip at the time of manufacture to prevent damage during transport and handling. This clip must be removed during installation. Failure to remove the spring clip will prevent the water heater from operating.

Flue Damper Operating Sequence

Damper Closed

When the thermostat contacts 'TH' are open the flue damper is held closed by power being applied to the damper motor via contact 'R1'. Relay contacts 'R2' and the end switch contacts 'ES' are open preventing power from entering the relay or ignition module circuit.



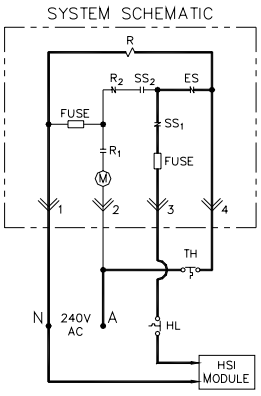
LEGEND

M – Damper motor
R – Relay Coil
R1 – N/C Relay contacts
R2 – N/O Relay contacts
ES – End Switch
SS1 – N/C Safety switch
SS2 – N/O Safety switch contacts
HL – High limit thermostat
TH – Thermostat controlling

NOTE: Circuit shown with damper in closed position, no call for heat.

Damper Open

When the thermostat contacts "TH' close power is supplied to the relay coil 'R', this causes contacts 'R1' to open cutting power to the flue damper motor, allowing the damper to open under spring tension. Once the flue damper is completely open the end switch 'ES' and the safety switch 'SS1' contacts close allowing power to the ignition module.



LEGEND

M – Damper motor
R – Relay Coil
R1 – N/C Relay contacts
R2 – N/O Relay contacts
ES – End Switch
SS1 – N/C Safety switch
SS2 – N/O Safety switch contacts
HL – High limit thermostat
TH – Thermostat controlling

NOTE: Circuit shown with damper in open position, call for heat.

Note: Should the ECO thermostat contacts open; the damper will open to allow the water heater to dissipate the abnormally high temperature quickly. The damper will not close until the ECO is manually reset.

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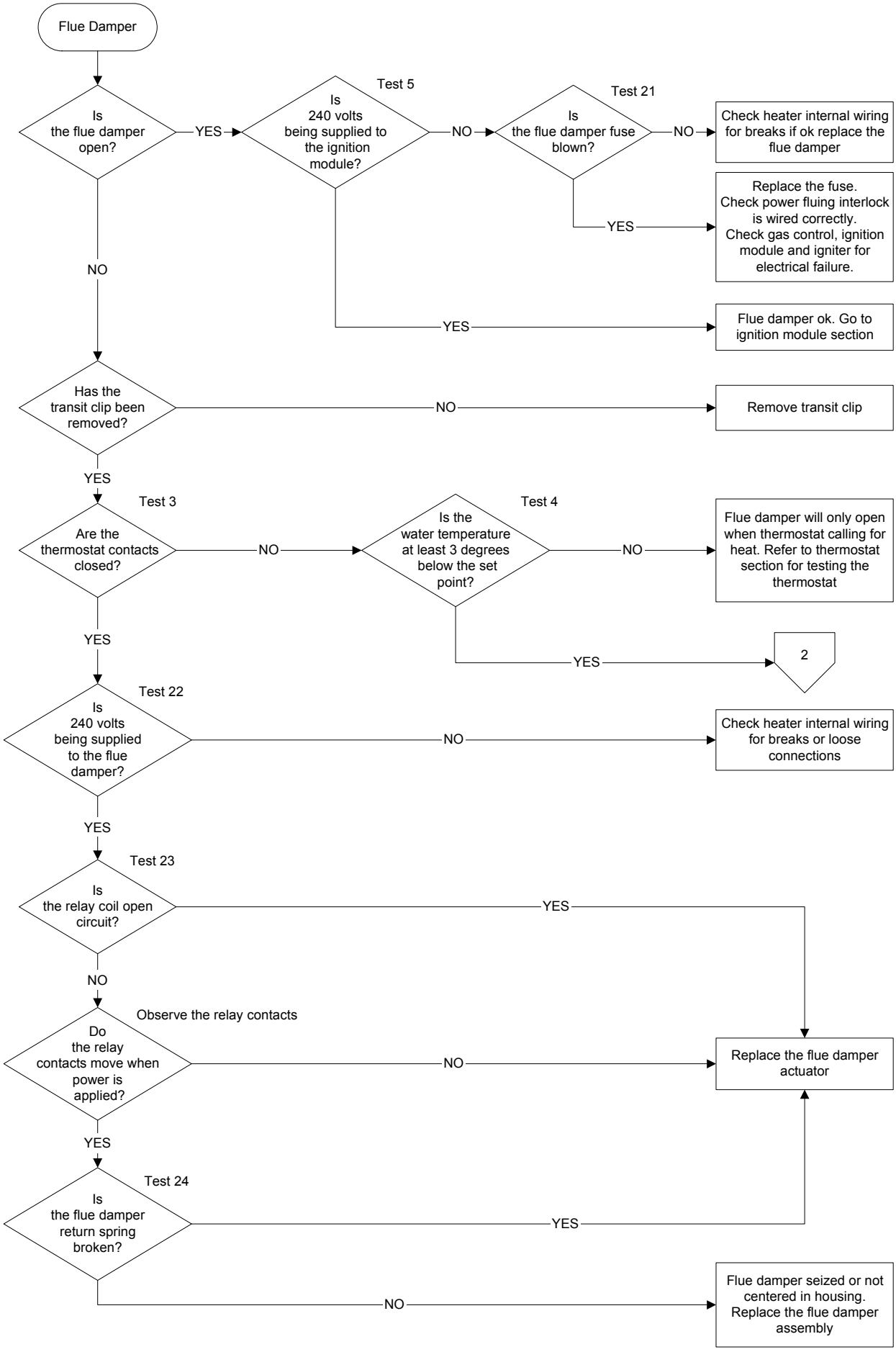
Flue Damper Fault Finding - Chart 8


Flue Damper
Is the flue damper open?
YES
Test 5
Is 240 volts being supplied to the ignition module?
NO
Test 21
Is the flue damper fuse blown?
NO
Check heater internal wiring for breaks if ok replace the flue damper
YES
Replace the fuse. Check power fluing interlock is wired correctly. Check gas control, ignition module and igniter for electrical failure.
YES
Flue damper ok. Go to ignition module section
NO
Has the transit clip been removed?
NO
Remove transit clip
YES
Test 3
Are the thermostat contacts closed?
NO
Test 4
Is the water temperature at least 3 degrees below the set point?
NO
Flue damper will only open when thermostat calling for heat. Refer to thermostat section for testing the thermostat
YES
2
YES
Test 22
Is 240 volts being supplied to the flue damper?
NO
Check heater internal wiring for breaks or loose connections
YES
Test 23
Is the relay coil open circuit?
YES
NO
Observe the relay contacts
Do the relay contacts move when power is applied?
NO
Replace the flue damper actuator
YES
Test 24
Is the flue damper return spring broken?
YES
NO
Flue damper seized or not centered in housing. Replace the flue damper assembly

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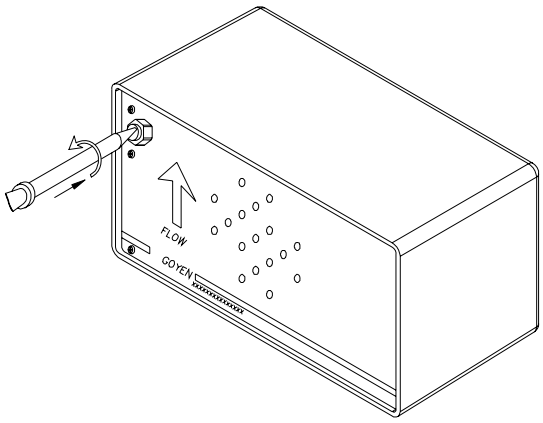
Test 21



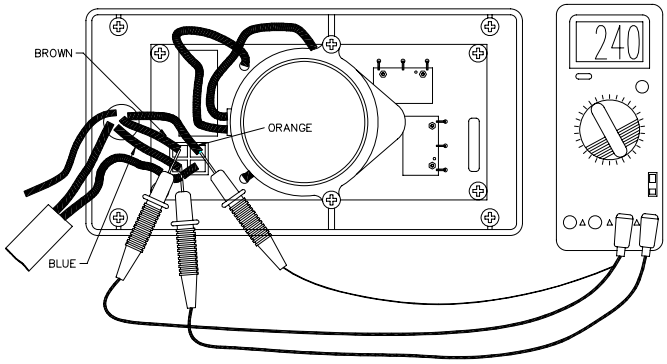
Isolate power before conducting this test

Using a flat blade screwdriver gently push and turn the fuse holder counter clockwise. Release pressure, the fuse holder will spring partially out.

Remove the fuse holder and using a multimeter set on the x1 resistance scale measure across the fuse.

Normal resistance is less than 1 ohm.

Test 22

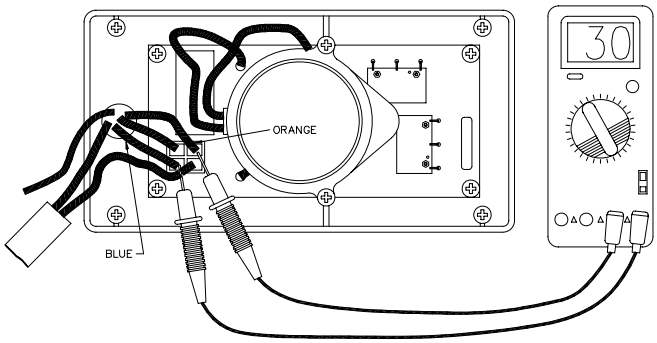


Components will be "live". Personal Protective Equipment should be worn when conducting this test

Remove the green cover from the flue damper actuator and using a multimeter set on the AC volts scale measure between the brown and blue wires and between the orange wire (going directly to the PCB) and blue wire.

Normal voltage for both tests is AC240 volts.

Test 23



Isolate power before conducting this test

Remove the green cover from the flue damper actuator and using a multimeter set on the x1K resistance scale, measure between the orange wire (going directly to the PCB) and the blue wire.

Normal resistance is approximately 30 kilo-ohms

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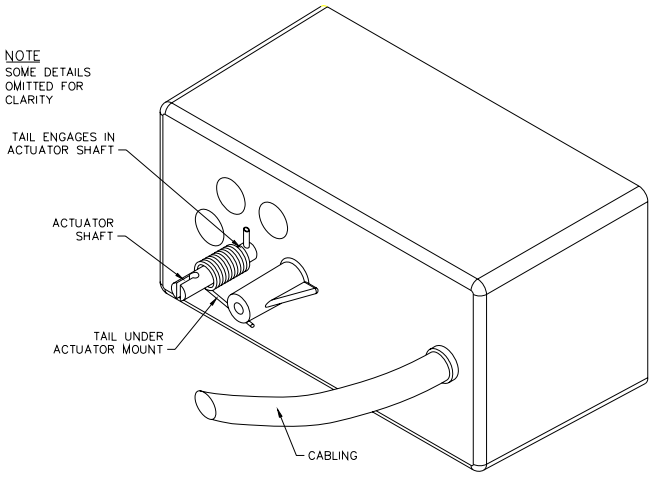
Component Test 24

Test 24

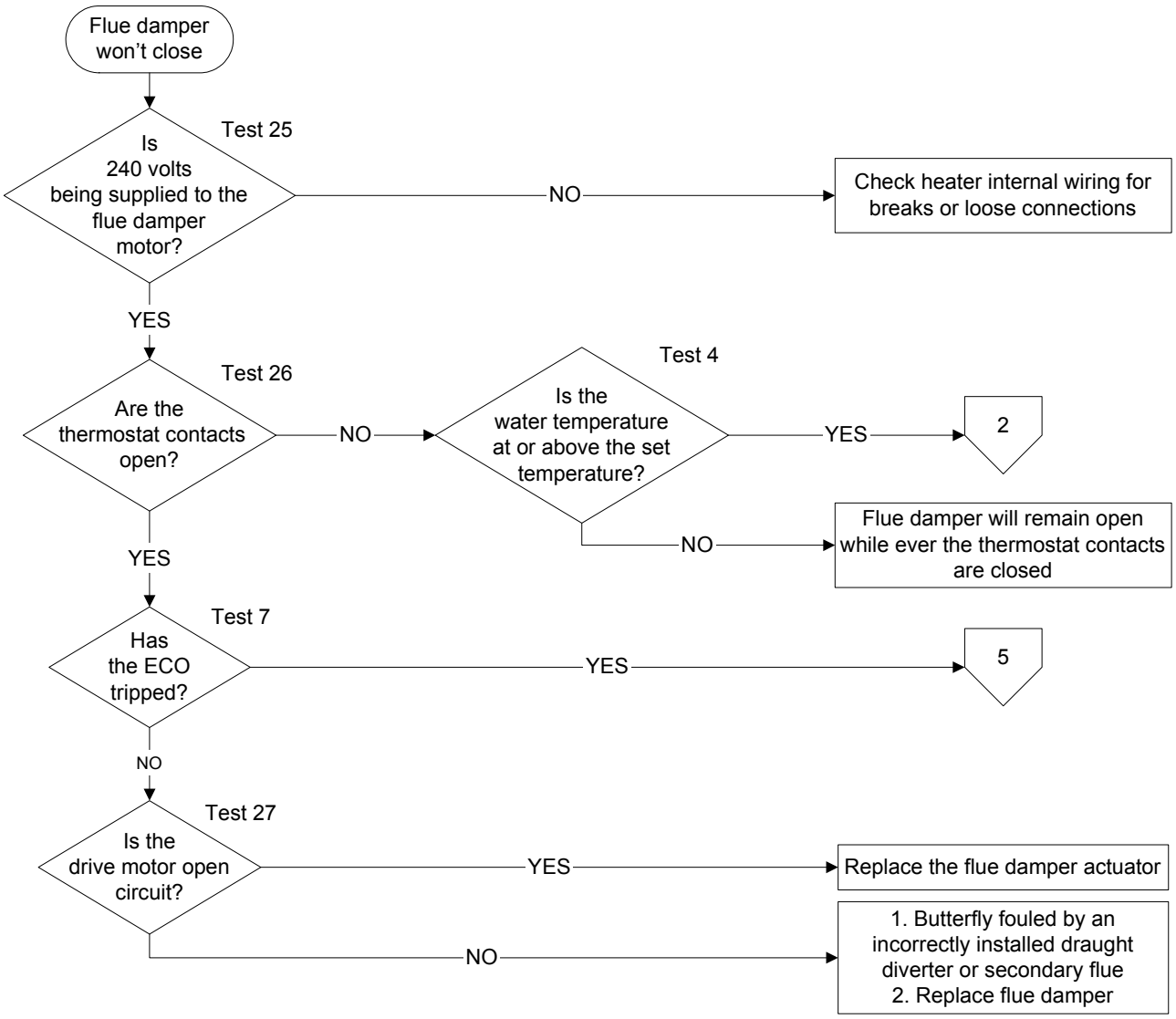


Isolate power before conducting this test

Remove the flue damper actuator from the flue damper assembly.

Carefully inspect the spring on the actuator. One tail of the spring should be engaged in a hole through the actuator shaft. The other tail of the spring should be engaged against the mounting post of the actuator.

Flue Damper Fault Finding - Chart 9



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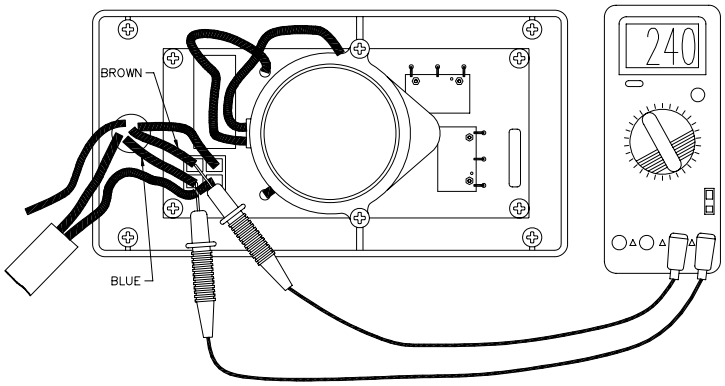
Test 25

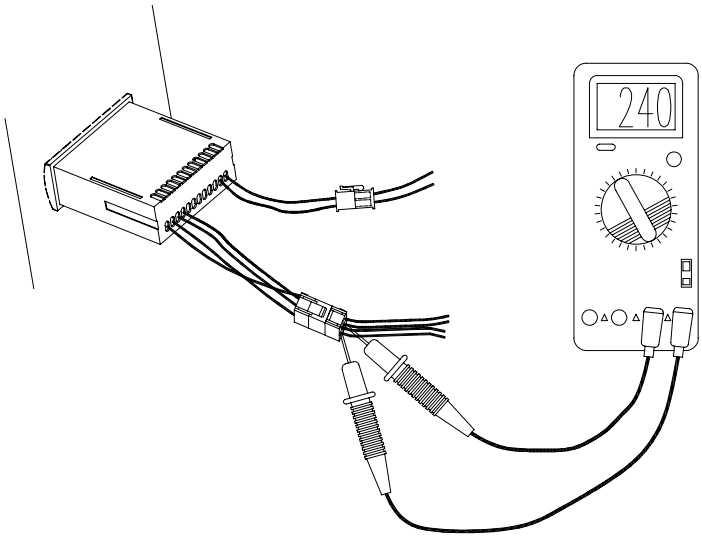


Components will be "live". Personal Protective Equipment should be worn when conducting this test

Remove the green cover from the flue damper actuator and using a multimeter set on the AC volts scale measure between the brown and blue wires.

Normal voltage is AC240 volts.

Test 26

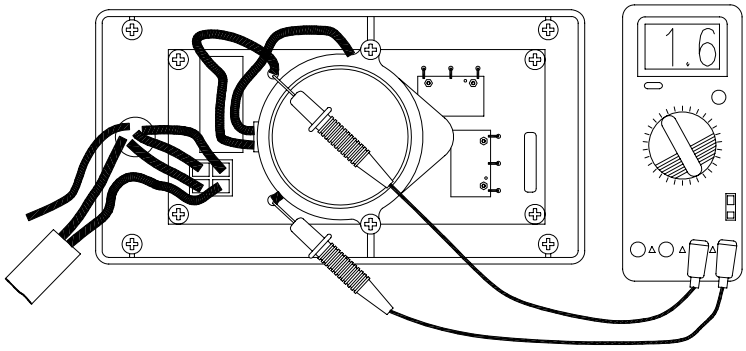


Components will be "live". Personal Protective Equipment should be worn when conducting this test.

Using a multimeter set on the AC volts scale, measure between terminal 1 (orange wire) and terminal 4 (blue wire) at the thermostat.

Normal voltage when thermostat contacts are open is AC0 volts

Test 27



Isolate power before conducting this test

Remove the green cover from the flue damper actuator and using a multimeter set on the x1K resistance scale measure between the two blue wires to the actuator motor.

Normal resistance is approximately 1.6 kilo-ohms.

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Flue Damper - Bypass

In the event the flue damper has failed, and a replacement is not on hand, the water heater can be wired to operate temporarily with the flue damper bypassed until a replacement is obtained.

⚠ **A replacement flue damper should be fitted as a matter of urgency.**

To bypass the flue damper electrically so the water heater will operate with it in the open position use the following procedure and wiring diagrams.

1. ***Isolate the power and remove the 3-pin plug from the power point.***
2. Remove the lower access panel.
3. Disconnect the orange wire from the thermostat. (Refer to Diagram 1 – Point 1)
4. Disconnect the orange switch wire from the terminal block. (Refer to Diag 1 – Point 2)
5. ***Disconnect the brown active wire to the flue damper and terminate using a closed end connector.*** (Refer to Diagram 1 – Point 3)
6. Run a temporary wire from the thermostat (Refer to diagram 2 – point 4) to the terminal block (Refer to diagram 2 – point 5)
7. Replace cover and restore power.

Diagram 1

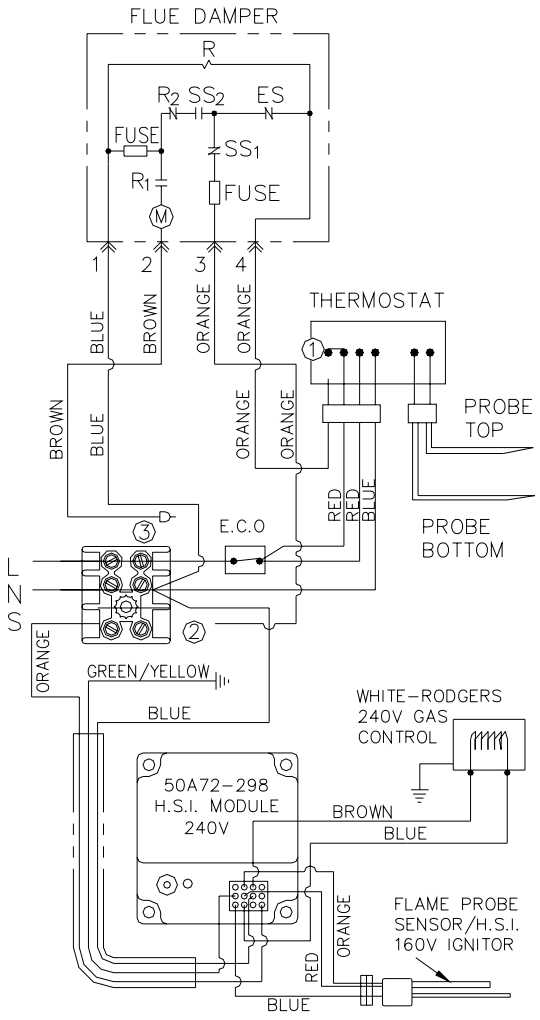
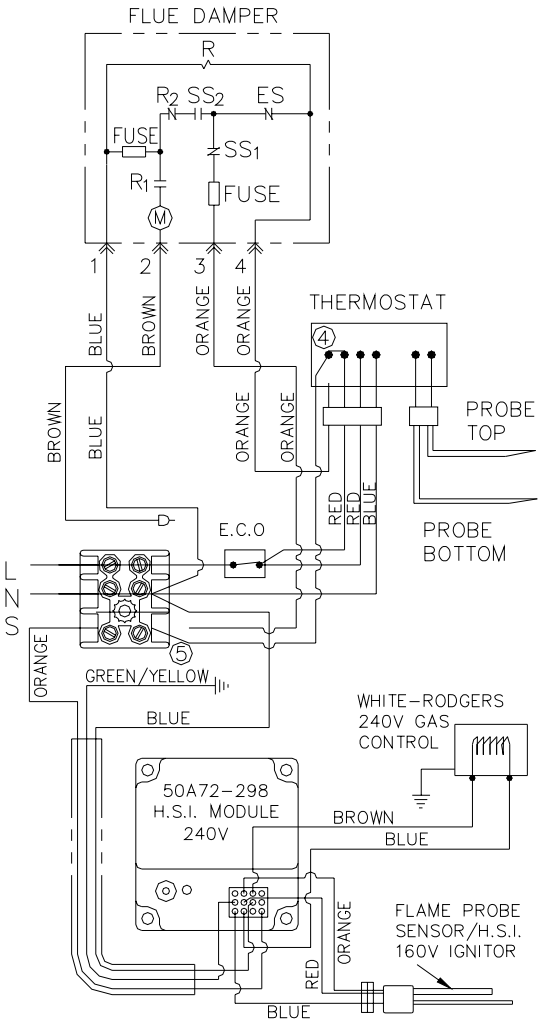


Diagram 2



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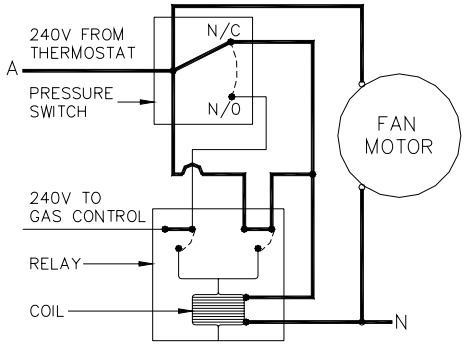
Combustion Fan, Pressure Switch and Relay - 631275 ONLY

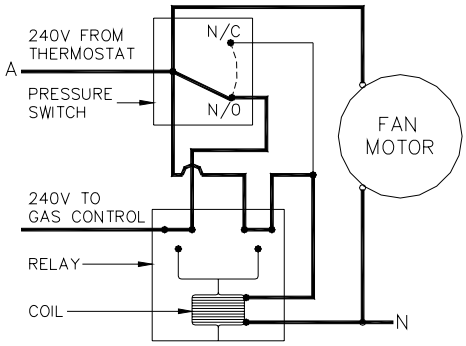
The combustion fan, relay (models manufactured before 09/02/05) and pressure switch are fitted to the 631275 models only, all are located in the fan module mounted in the air duct at the front of the heater.

The combustion fan provides the primary air under pressure required for successful combustion. The pressure switch and relay are electrically interlocked to ensure the combustion fan is running at sufficient speed and pressure before a trial for ignition is attempted (refer to the following diagrams for sequence of operation).

When the thermostat contacts close power is supplied to the fan motor and to the relay coil via the normally closed contact of the pressure switch. The relay closes 2 sets of contacts. The first set of contacts latch the relay coil so that power is maintained to the relay coil when the pressure switch moves from the normally closed to normally open position. The second set of contacts close the circuit to the ignition module, however power is not available at this stage.

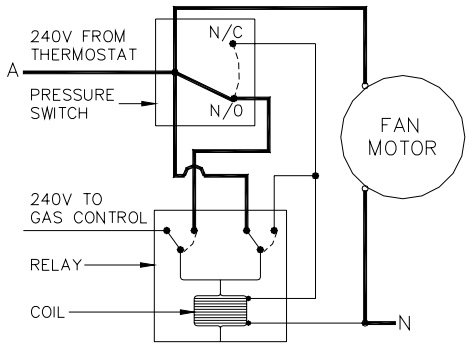


Once sufficient air pressure is achieved the pressure switch contacts move from the normally closed to the normally open position, power is then supplied through the relay contacts to the ignition module allowing the ignition sequence to commence. Power is maintained to the relay coil via the latching circuit.



Fan 'Run On'

In the event of a very short interruption of power, known as a "brown out" and usually lasting less than a second or so, the gas valve, ignition module and relay all open which results in the burner extinguishing, however the fan continues to coast, maintaining enough pressure for the pressure switch contacts to remain in the normally open position. When the power is restored the fan continues to run due to the thermostat being closed but power is not supplied to the relay coil resulting in the ignition sequence not restarting. The ignition module does not indicate a fault code in this event.



631275 models manufactured after the 09/02/05 do not have a relay but utilise a different ignition module (50A71-178) which eliminates the need for the relay.

This new ignition module utilises an internal method of checking the pressure switch position (position proving) and also supplies power to the combustion fan thus rendering the relay and its associated wiring obsolete. For more information refer to the 'Product Changes' section on page 15 and the wiring diagram on page 12.

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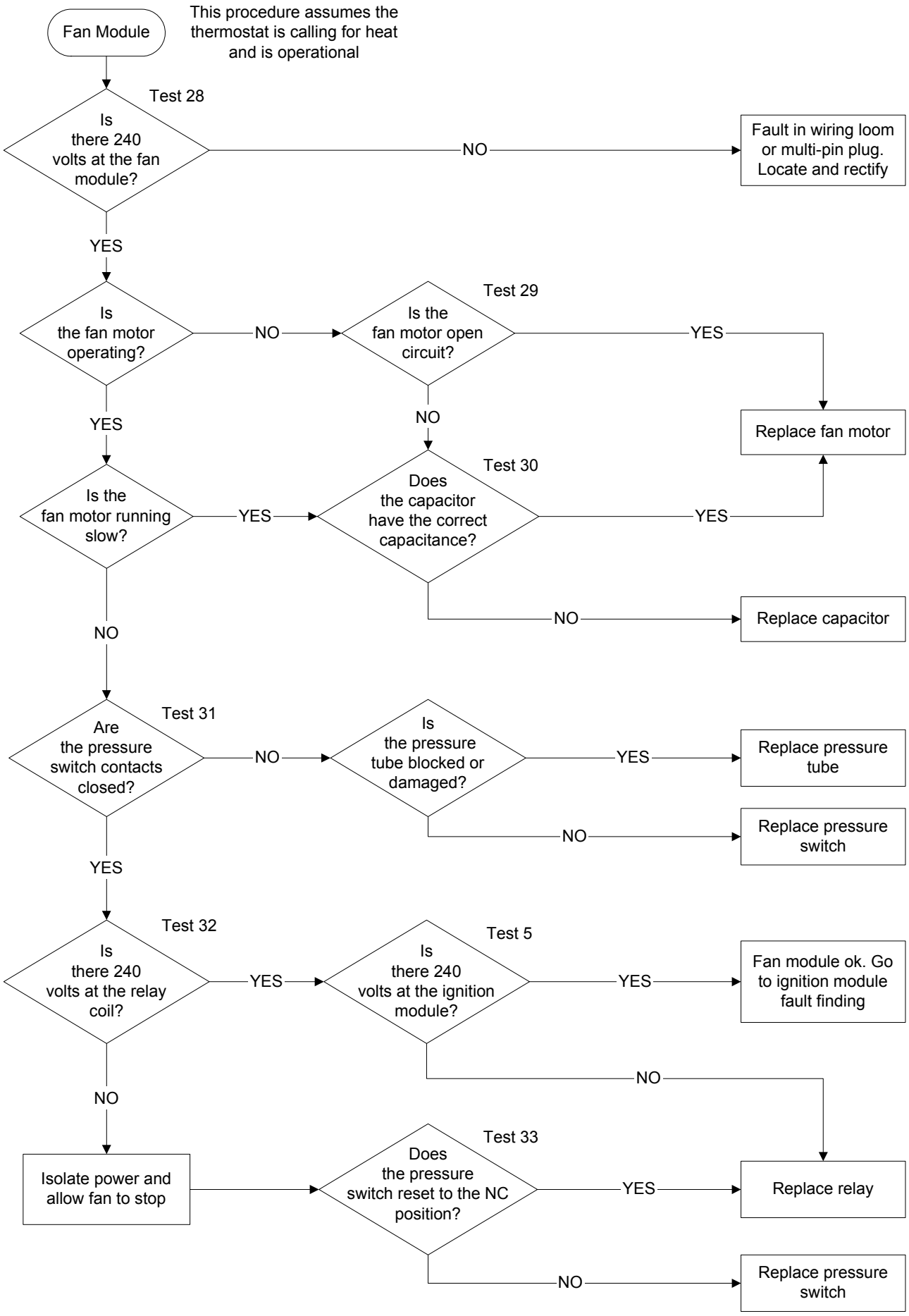
Fan Module Fault Finding - Chart 10 (631275 Manufactured Before 09/02/05)



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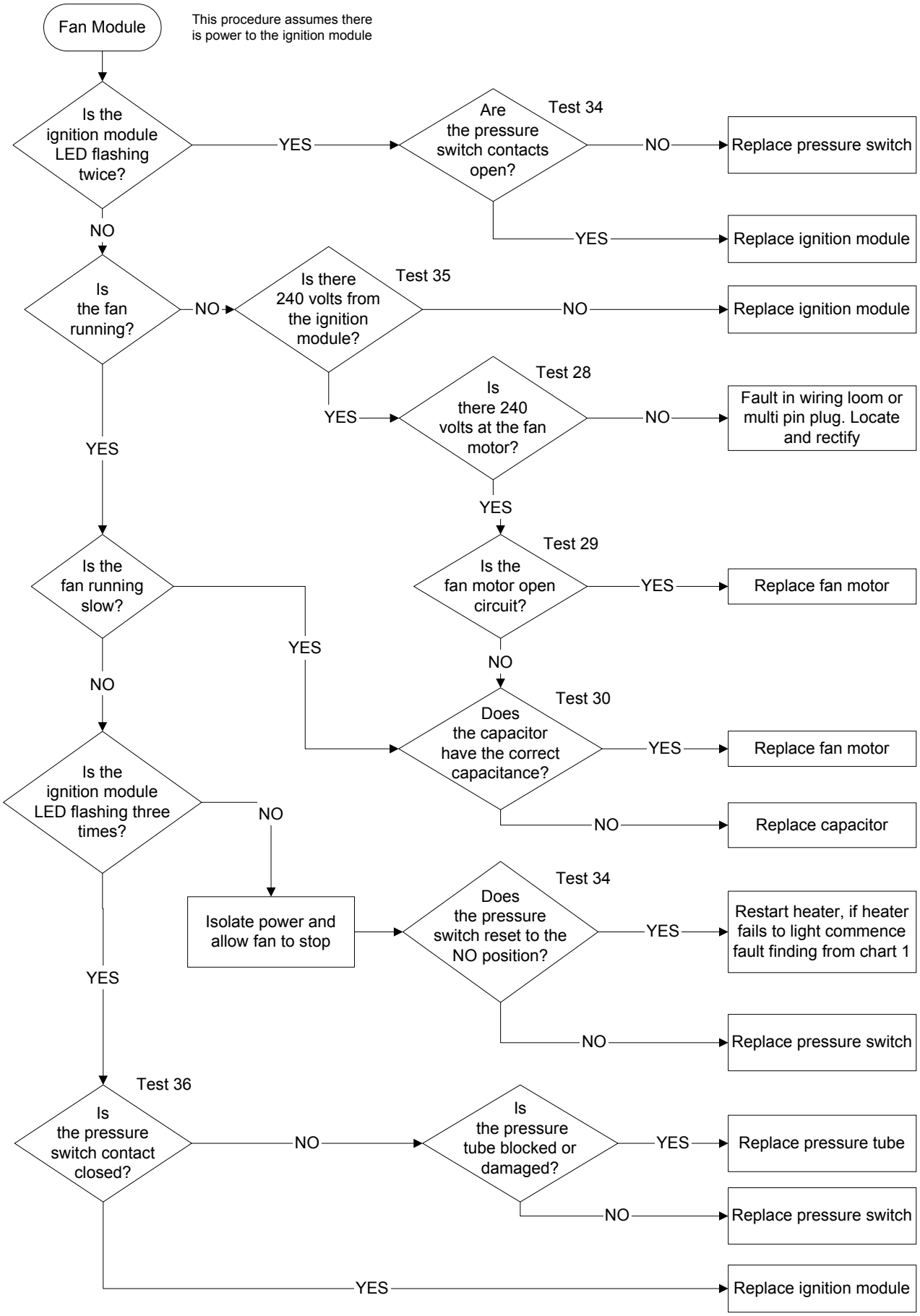
Fan Module Fault Finding - Chart 11 (631275 Manufactured After 09/02/05)

2 Flashes (Pressure Switch Not Open) and 3 Flashes (Pressure Switch Not Closed)



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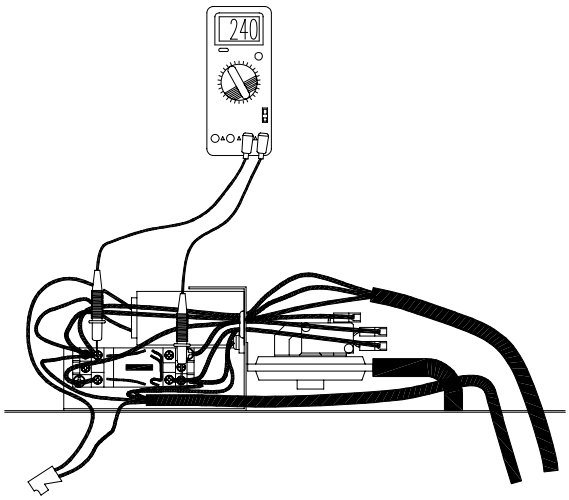
Component Tests 28 – 30

NOTE: In order to conduct tests 28 - 30 the fan module should be removed from the air duct and placed on a stable work area.

WARNING: Whilst conducting test 28 the fan motor may be rotating, ensure loose clothing and hands are kept well clear of the fan blade.

Test 28



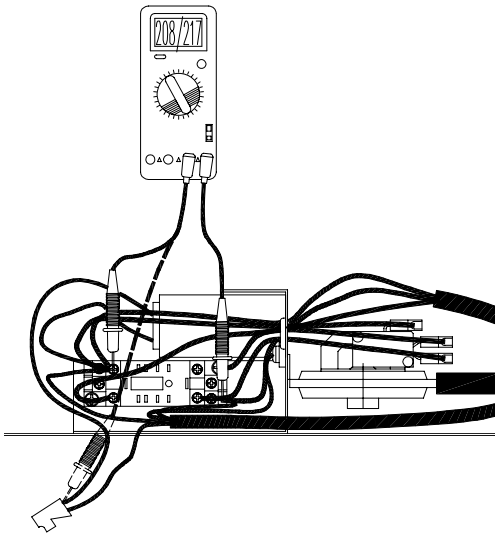
Components will be "live". Personal Protective Equipment should be worn when conducting this test

Note: The thermostat must be calling for heat to conduct this test. To prevent the burner commencing operation disconnect and insulate the wiring to the gas valve

Using a multimeter set on the AC volts scale, measure between the orange wire (pre 09/02/05) or brown wire (post 09/02/05) and the blue wire at the fan module unit.

Normal voltage is AC240V

Test 29



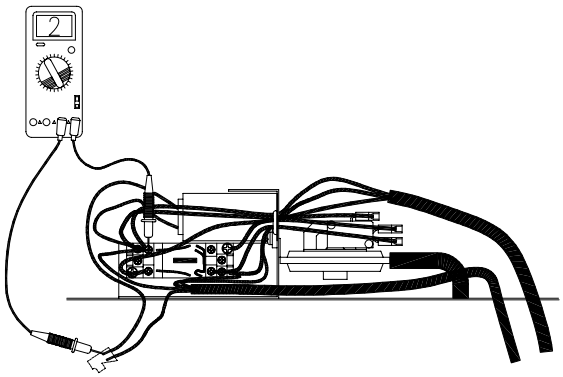
Isolate power before conducting this test.

Pre 9/2/05 Models: Remove the relay from the relay base

Using a multimeter set on the x1 resistance scale, measure between the blue wire and the brown wire and between the blue wire and the black wire to the fan motor.

Normal resistance is:
Blue – Brown 222 ohms
Blue – Black 218 ohms

Test 30



Isolate power before conducting this test.

Disconnect the brown wire from the fan motor to the capacitor. Using a multimeter set on the capacitance scale, measure between the 2 white leads of the capacitor.

Normal reading is 2 micro-farads

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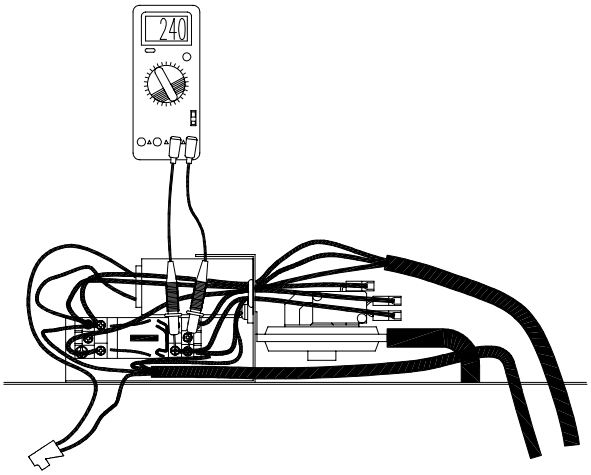
Component Tests 31 – 33

NOTE: In order to conduct tests 31 - 32 the fan module should be removed from the air duct and placed on a stable work area.

WARNING: Whilst conducting tests 31 and 32 the fan motor may be rotating, ensure loose clothing and hands are kept well clear of the fan blade.

Test 31



Components will be "live". Personal Protective Equipment should be worn when conducting this test

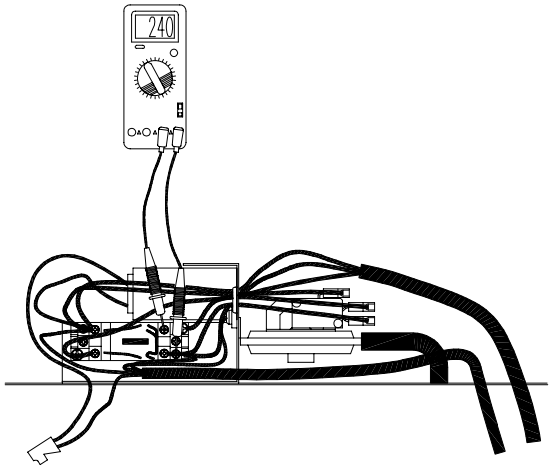
Note: The thermostat must be calling for heat to conduct this test.

To prevent the burner commencing operation disconnect and insulate the wiring to the gas valve

Using a multimeter set on the AC volts scale, measure between the black wire on the micro-switch and the blue wire on the relay base.

Normal voltage is AC240V

Test 32



Components will be "live". Personal Protective Equipment should be worn when conducting this test

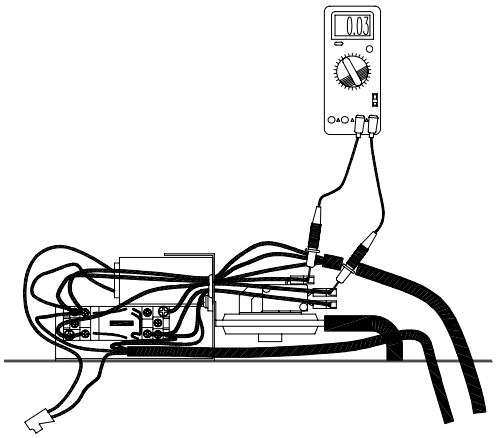
Note: The thermostat must be calling for heat to conduct this test.

To prevent the burner commencing operation, disconnect and insulate the wiring to the gas valve.

Using a multimeter set on the AC volts scale, measure between the brown and blue wires on the relay base.

Normal voltage is AC240 volts.

Test 33



Isolate power before conducting this test.

Note: Wait for the fan to stop before conducting this test.

Using a multimeter set on the x1 resistance scale, measure between the red and brown wires on the micro-switch.

Normal resistance should be less than 1 ohm.

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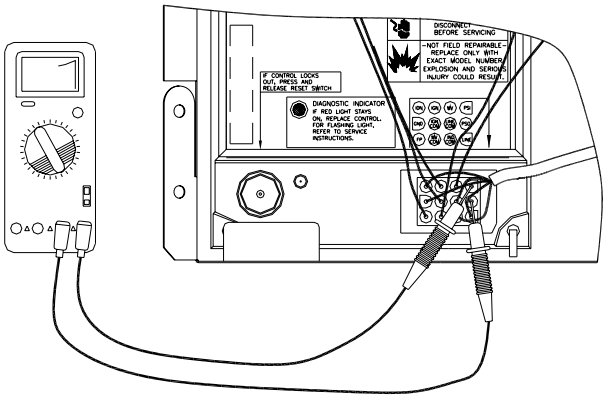
Component Tests 34 – 36

NOTE: It is not necessary to remove the fan module from the air duct to conduct tests 34 – 36 however if the module has been removed to conduct previous tests observe the warning below.

WARNING: Whilst conducting tests 35 and 36 the fan motor will be rotating, ensure loose clothing and hands are kept well clear of the fan blade.

Test 34



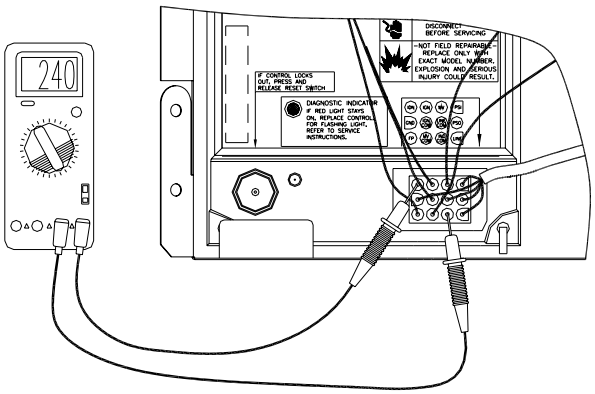
Isolate power before conducting this test.

Note: Wait for the fan to stop before conducting this test.

Using a multimeter set on the x1 resistance scale, measure between terminals PSO and PSI on the ignition module.

Normal resistance should be infinity ohms.

Test 35

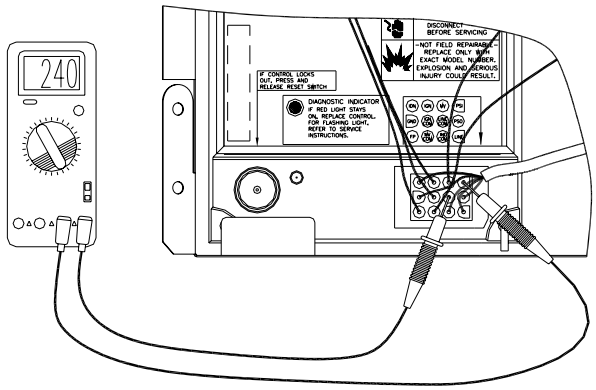


Components will be "live". Personal Protective Equipment should be worn when conducting this test

Note: The thermostat must be calling for heat to conduct this test. Using a multimeter set on the AC volts scale, measure between the IND and IND COM terminals on the ignition module.

Normal voltage is AC240 volts.

Test 36



Components will be "live". Personal Protective Equipment should be worn when conducting this test

Note: The thermostat must be calling for heat and the fan running to conduct this test. Using a multimeter set on the AC volts scale, measure between the PSI and Line COM terminals on the ignition module.

Normal voltage is AC240 volts.

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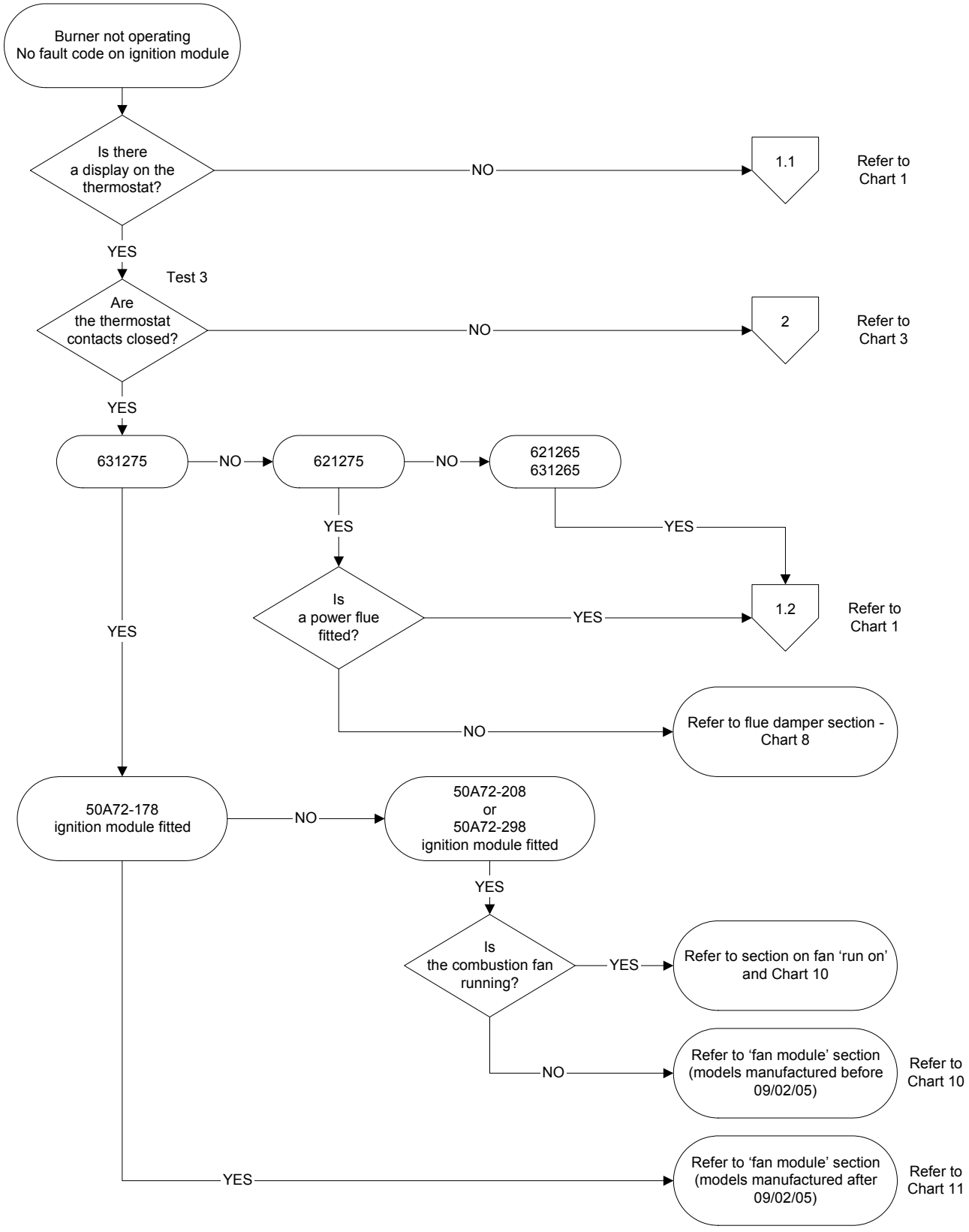
Fault Finding (No error code / No Operation) – Chart 12

In order for the burner to operate and fault codes to be displayed the ignition module must be receiving voltage, where a heater is not operational and the ignition module does not display a fault code it will be necessary to determine if the ignition module is receiving power.



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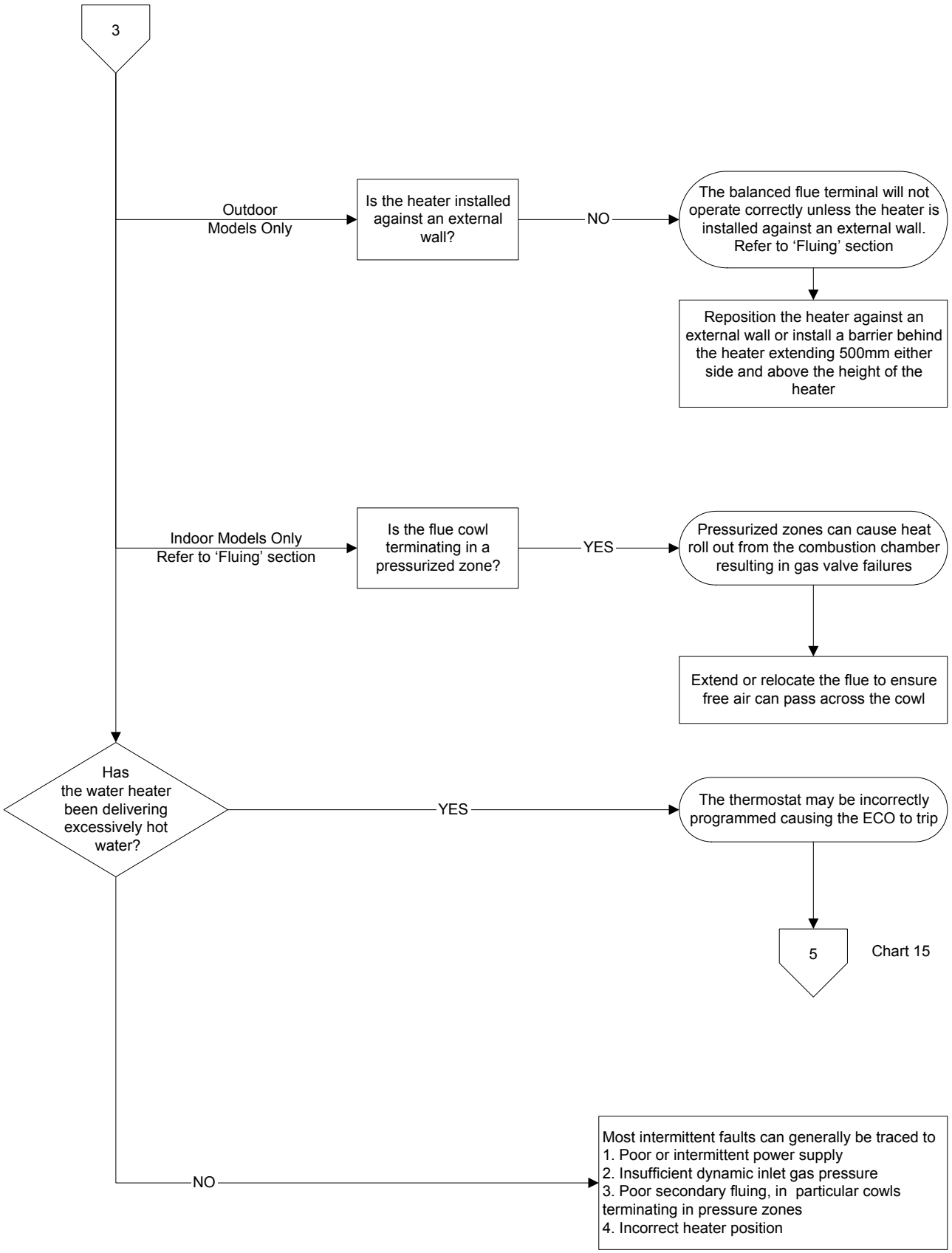
Fault Finding (Intermittent Operation) - Chart 13


3
Outdoor Models Only
Is the heater installed against an external wall?
NO
The balanced flue terminal will not operate correctly unless the heater is installed against an external wall. Refer to 'Fluing' section
Reposition the heater against an external wall or install a barrier behind the heater extending 500mm either side and above the height of the heater
Indoor Models Only Refer to 'Fluing' section
Is the flue cowl terminating in a pressurized zone?
YES
Pressurized zones can cause heat roll out from the combustion chamber resulting in gas valve failures
Extend or relocate the flue to ensure free air can pass across the cowl
Has the water heater been delivering excessively hot water?
YES
The thermostat may be incorrectly programmed causing the ECO to trip
5
Chart 15
NO
Most intermittent faults can generally be traced to
1. Poor or intermittent power supply
2. Insufficient dynamic inlet gas pressure
3. Poor secondary fluing, in particular cowls terminating in pressure zones
4. Incorrect heater position

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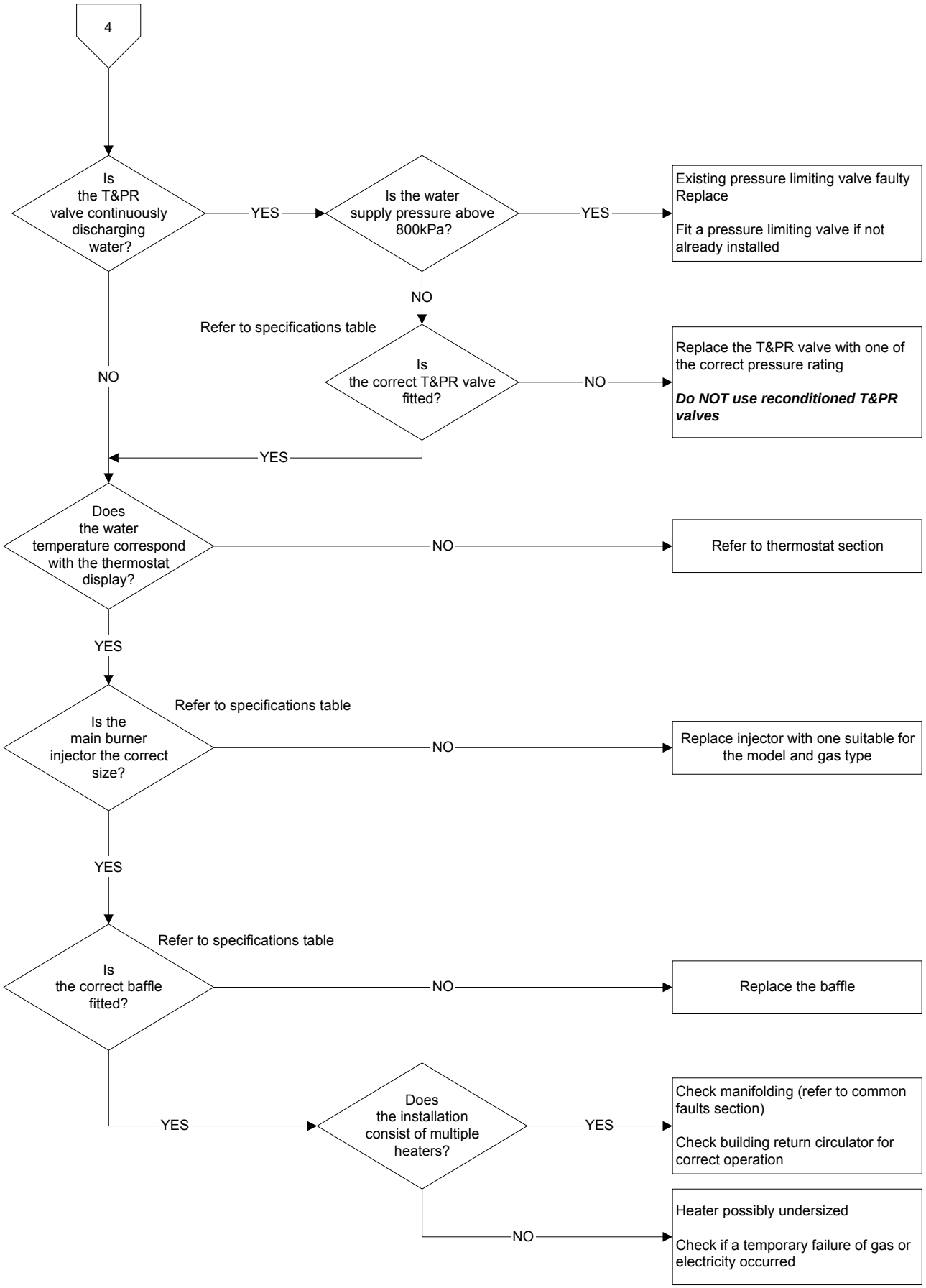
Fault Finding (Insufficient Hot Water) - Chart 14


4
Is the T&PR valve continuously discharging water?
YES
Is the water supply pressure above 800kPa?
YES
Existing pressure limiting valve faulty Replace
Fit a pressure limiting valve if not already installed
NO
Refer to specifications table
Is the correct T&PR valve fitted?
NO
Replace the T&PR valve with one of the correct pressure rating
Do NOT use reconditioned T&PR valves
NO
YES
Does the water temperature correspond with the thermostat display?
NO
Refer to thermostat section
YES
Refer to specifications table
Is the main burner injector the correct size?
NO
Replace injector with one suitable for the model and gas type
YES
Refer to specifications table
Is the correct baffle fitted?
NO
Replace the baffle
YES
Does the installation consist of multiple heaters?
YES
Check manifolding (refer to common faults section)
Check building return circulator for correct operation
NO
Heater possibly undersized
Check if a temporary failure of gas or electricity occurred

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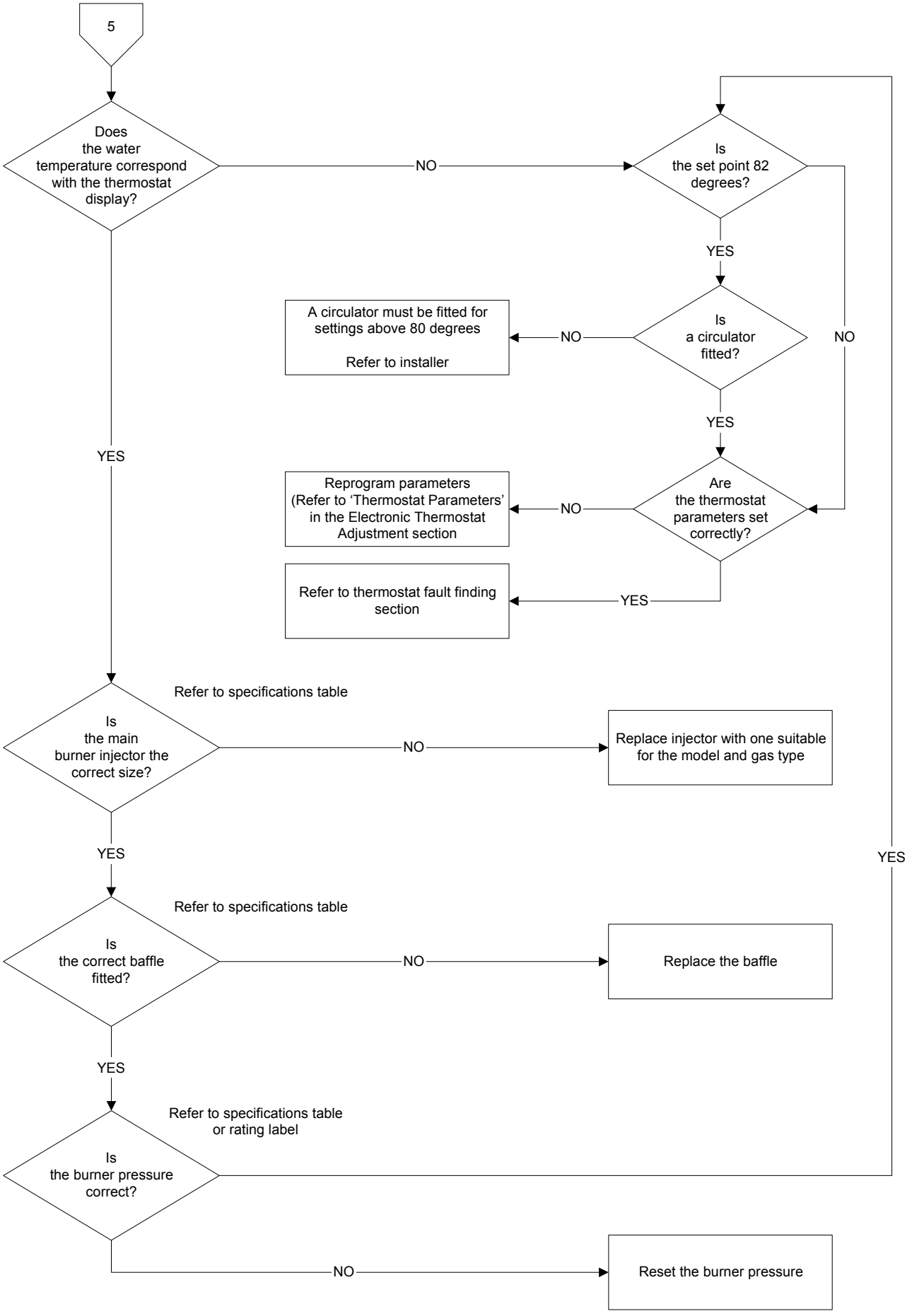
Fault Finding (Water Too Hot) - Chart 15



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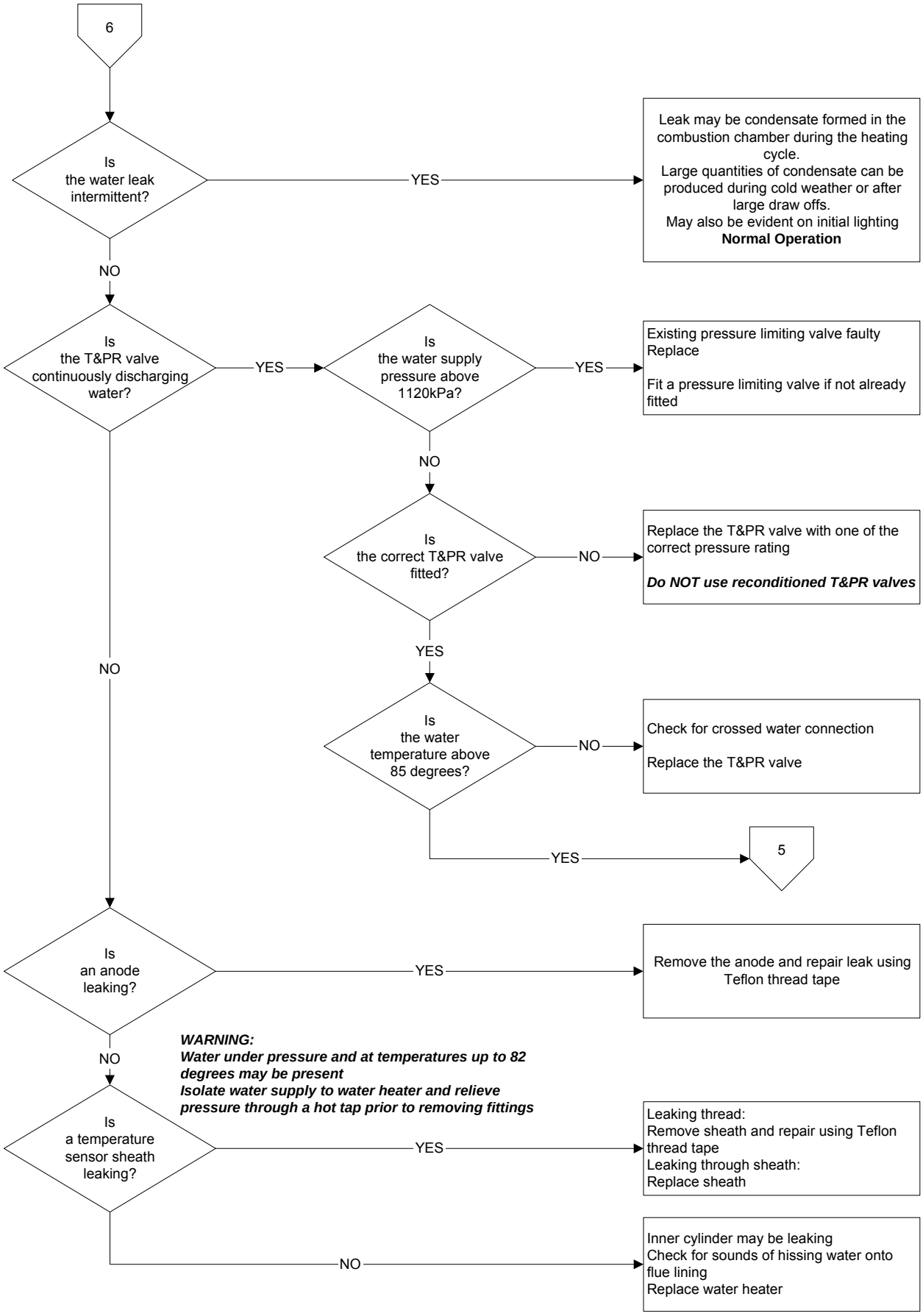
Fault Finding (Leaking Water Heater) - Chart 16


6
Is the water leak intermittent?
YES
Leak may be condensate formed in the combustion chamber during the heating cycle.
Large quantities of condensate can be produced during cold weather or after large draw offs.
May also be evident on initial lighting
Normal Operation
NO
Is the T&PR valve continuously discharging water?
YES
Is the water supply pressure above 1120kPa?
YES
Existing pressure limiting valve faulty
Replace
Fit a pressure limiting valve if not already fitted
NO
Is the correct T&PR valve fitted?
NO
Replace the T&PR valve with one of the correct pressure rating
Do NOT use reconditioned T&PR valves
YES
NO
Is the water temperature above 85 degrees?
NO
Check for crossed water connection
Replace the T&PR valve
YES
5
Is an anode leaking?
YES
Remove the anode and repair leak using Teflon thread tape
NO
WARNING:
Water under pressure and at temperatures up to 82 degrees may be present
Isolate water supply to water heater and relieve pressure through a hot tap prior to removing fittings
Is a temperature sensor sheath leaking?
YES
Leaking thread:
Remove sheath and repair using Teflon thread tape
Leaking through sheath:
Replace sheath
NO
Inner cylinder may be leaking
Check for sounds of hissing water onto flue lining
Replace water heater

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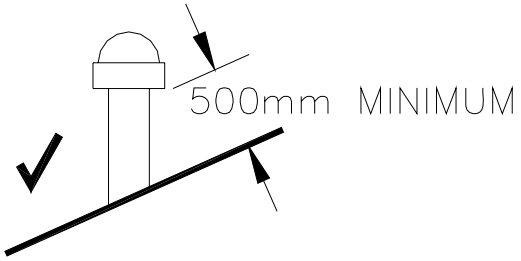
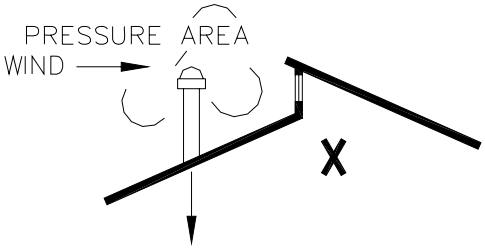
Indoor Models

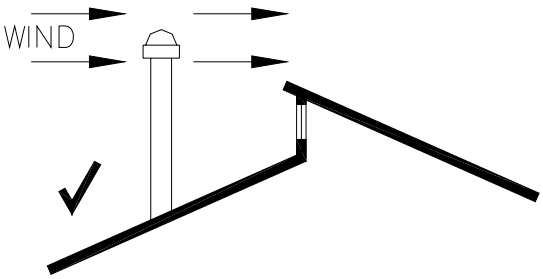
Reverse flow (down draught) in the flue occurs when pressure at the flue outlet (cowl) is greater than that inside the water heater.

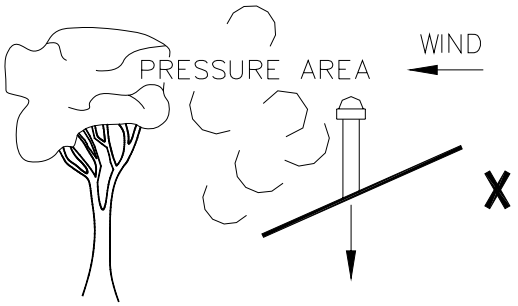
In this condition, flue gases are discharged through the draught diverter into the room where the water heater is located. This is of no consequence where occasional wind conditions may cause small intermittent discharge, however in severe conditions excessive down draught can cause flame roll out from the combustion chamber, burner outage and sooting.

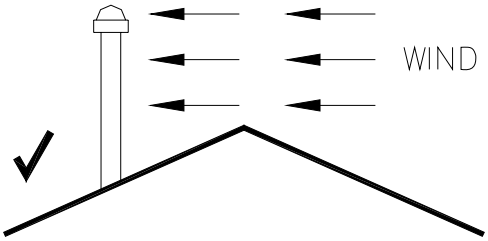
The location of the flue cowl is critical to the correct operation of the flue system. The diagrams below detail the correct and incorrect location of the flue outlet. In many cases the position of the flue cowl is a major contributor to repeated component failure i.e. the gas valve or the unreliable operation of the water heater generally.

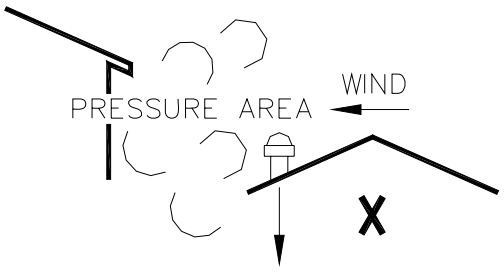


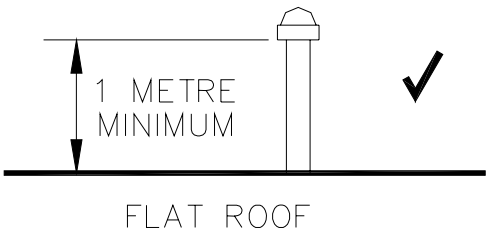


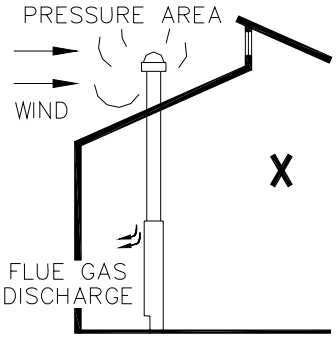












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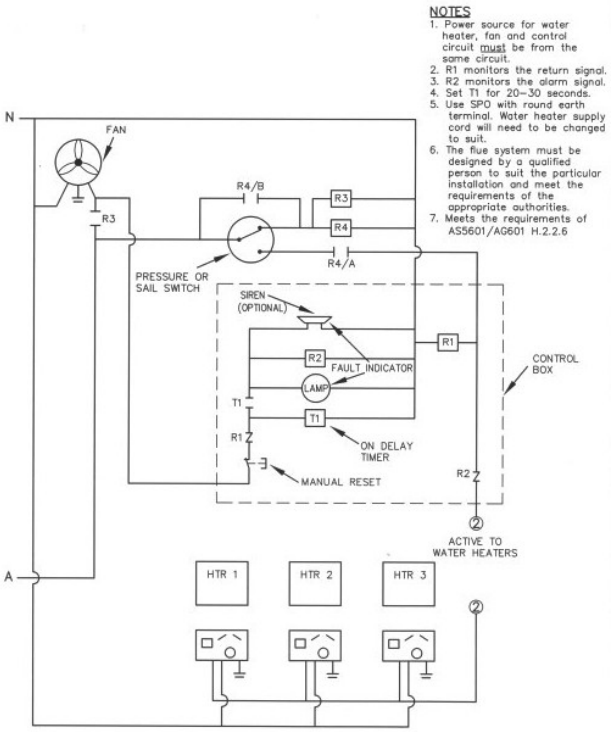
Power Fluing / Mechanical Ventilation

Where a fan is used to assist with the fluing (power fluing) or to provide sufficient primary air for combustion (mechanical ventilation) the fan must be electrically interlocked with the water heater(s) to prevent ignition in the event the fan fails.

This is generally done by the use of a contactor (relay) and a sail or pressure switch mounted in the flue to detect airflow.

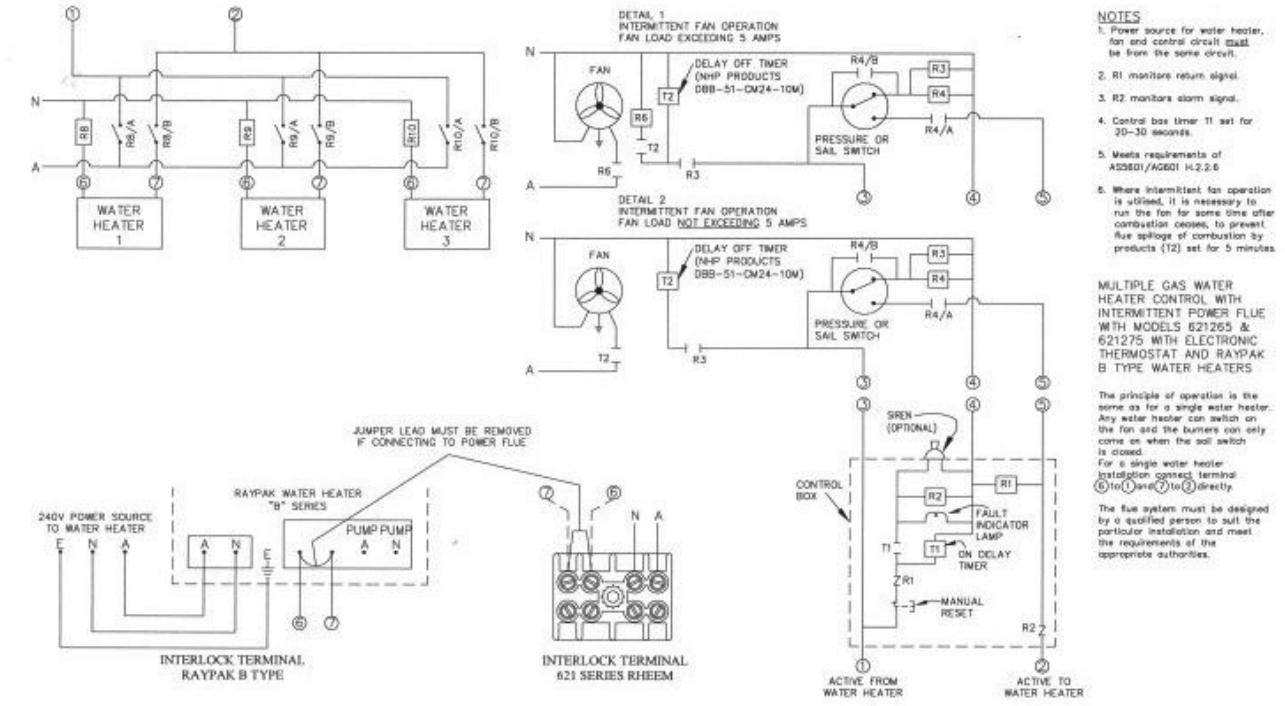
The diagrams opposite and below detail one method for interlocking a power flue system to the water heater(s), mechanical ventilation systems would also be wired in a similar manner.

.


NOTES
1. Power source for water heater, fan and control circuit must be from the same circuit.
2. R1 monitors the return signal.
3. R2 monitors the alarm signal.
4. Set T1 for 20–30 seconds.
5. Use SPO with round earth terminal. Water heater supply cord will need to be changed to suit.
6. The flue system must be designed by a qualified person to suit the particular installation and meet the requirements of the appropriate authorities.
7. Meets the requirements of AS5601/AG601 H.2.2.6
N
A
FAN
R3
R4/B
R4
R4/A
PRESSURE OR SAIL SWITCH
SIREN (OPTIONAL)
R1
R2
FAULT INDICATOR LAMP
CONTROL BOX
T1
ON DELAY TIMER
MANUAL RESET
ACTIVE TO WATER HEATERS
HTR 1
HTR 2
HTR 3

24 hour Fan Operation

Where multiple water heaters are installed each **individual** water heater must be interlocked with the fan system. The diagrams below detail a common method of interlocking multiple water heaters to a power flue system


WATER HEATER 1
WATER HEATER 2
WATER HEATER 3
DETAIL 1
INTERMITTENT FAN OPERATION
FAN LOAD EXCEEDING 5 AMPS
DETAIL 2
INTERMITTENT FAN OPERATION
FAN LOAD NOT EXCEEDING 5 AMPS
FAN
DELAY OFF TIMER (NHP PRODUCTS DBB-51-DM24-10M)
PRESSURE OR SAIL SWITCH
JUMPER LEAD MUST BE REMOVED IF CONNECTING TO POWER FLUE
240V POWER SOURCE TO WATER HEATER
RAYPAK WATER HEATER "B" SERIES
PUMP
INTERLOCK TERMINAL RAYPAK B TYPE
INTERLOCK TERMINAL 621 SERIES RHEEM
SIREN (OPTIONAL)
CONTROL BOX
FAULT INDICATOR LAMP
ON DELAY TIMER
MANUAL RESET
ACTIVE FROM WATER HEATER
ACTIVE TO WATER HEATER
NOTES
1. Power source for water heater, fan and control circuit must be from the same circuit.
2. R1 monitors return signal.
3. R2 monitors alarm signal.
4. Control box timer T1 set for 20–30 seconds.
5. Meets requirements of AS5601/AG601 H.2.2.6
6. Where intermittent fan operation is utilised, it is necessary to run the fan for some time after combustion ceases, to prevent flue spillage of combustion by products (12) set for 5 minutes.
MULTIPLE GAS WATER HEATER CONTROL WITH INTERMITTENT POWER FLUE WITH MODELS 621265 & 621275 WITH ELECTRONIC THERMOSTAT AND RAYPAK B TYPE WATER HEATERS
The principle of operation is the same as for a single water heater. Any water heater can switch on the fan and the burners can only come on when the sail switch is closed.
For a single water heater installation connect terminal 6 to 1 and 7 to 2 directly.
The flue system must be designed by a qualified person to suit the particular installation and meet the requirements of the appropriate authorities.

Intermittent Fan Operation

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Outdoor models

In practice it is almost impossible to achieve exact balance between the pressure on the air inlet and flue outlet of a balanced flue terminal.

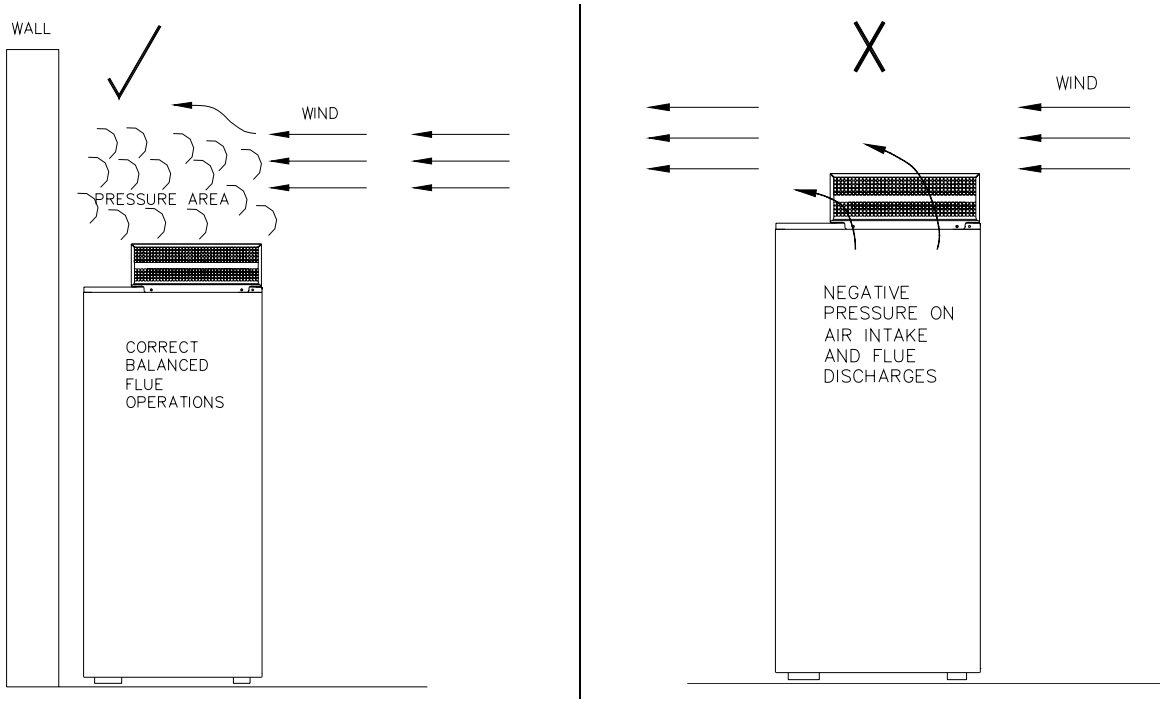
In order to avoid the possibility of reverse fluing the flue terminal design is always biased to provide slightly higher pressure on the air inlet. The flue terminal on outdoor water heaters has the air inlet towards the rear.

When the water heater is installed against an external wall, the pressure zone created by any wind will produce the required pressure imbalance for the flue terminal to operate correctly.

If the water heater is not installed against a wall, the pressures at the air inlet and flue outlet become unpredictable, resulting in the combustion system not operating correctly.

Specifically, there may be flame roll out from the combustion chamber, flame lift off from the burner, sooting of the primary flue and flue terminal and/or flame failure problems.

Below are examples of the correct and incorrect installation of an outdoor water heater.



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WARNING

H.S.I models are fitted with a 3 plug. All procedures relating to replacement of electrical components assume removal of the plug from the GPO will safely isolate the appliance electrically

HOWEVER where ancillary equipment, such as a power flue, has been electrically interlocked with the water heater or the water heater has been hard wired extreme caution must be exercised to ensure 'live' conductors are not present from the additional circuit(s)

It is strongly recommended that the power supply to all ancillary equipment is also isolated when servicing any water heater electrically interlocked to it

Personal Protective Equipment should be worn to reduce the risk of electric shock Refer to Rheem Safety Procedure on electrical testing

Draining the Water Heater (Procedure 1)

Elevated temperatures may be present during the draining process. Personal Protective Equipment should be worn to prevent the risk of scalding

1. ***Remove 3-pin plug from GPO and isolate the gas and water supplies to the water heater***
2. ***Relieve pressure from the water heater through T & PR valve or a hot tap***
3. Fit a drain hose to the drain cock outlet and run the other end to a drain or safe location
4. Open the drain cock
5. Open the temperature and pressure relief valve to allow air into the system

Gas Control Replacement (Procedure 2)

1. ***Remove 3-pin plug from GPO & isolate gas supply to heater (note warning above)***
2. *Outdoor Models* - Remove the lower access door

   Indoor Models - Remove the gas valve cover **Note:** It will be necessary to disconnect the wiring to the thermostat, temperature sensor and ignition module to allow complete removal of the gas valve cover
3. Disconnect the wiring from the ignition module to the gas valve terminal block, noting the positions of each wire.
4. Disconnect the inlet gas pipe work
5. Disconnect the burner feed pipe
6. Remove the screw retaining the gas valve to the support bracket
7. Remove the gas valve
8. Reassemble in the reverse order of above. **Note:** On indoor models ensure the lip on the bottom of the gas control cover engages inside the jacket opening
9. Restore gas and test all inlet gas connections for leaks using soapy water solution
10. Restore power
11. Allow heater to light and test all outlet gas connections for leaks using soapy water solution. **NOTE:** On the 631275 it will be necessary to hold the door switch closed while conducting the leak test

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Burner Replacement (Procedure 3)

1. ***Remove 3-pin plug from GPO & isolate gas supply to heater (note warning on page 59)***
2. *Outdoor Models* - Remove the lower access door

   Indoor Models - Remove the gas valve cover **Note:** It will be necessary to disconnect the wiring to the thermostat, temperature sensor and ignition module to allow complete removal of the gas valve cover
3. *Outdoor models* - Remove the burner access panel **Note:** On 631275 models it will be necessary to disconnect the wiring to the door switch to remove the cover
4. Disconnect the burner feed pipe at the gas control
5. Disconnect the wiring to the igniter and flame sensor rod at the 3-pin connector plug
6. *275 models* - Remove the heat shield (3 screws) located at the top of the combustion chamber opening and the 2 screws retaining the injector bracket to the burner, the burner feed pipe assembly can now be removed
7. Remove screws retaining the burner to the water heater jacket
8. Carefully withdraw the burner ensuring the flame sensor rod and igniter is not damaged
9. Remove the igniter and heat shield assembly from the old burner
10. Reassemble in reverse order of above. **Note:** Care must be taken to ensure that the igniter wiring heat shield is fitted correctly when fitting the igniter to the new burner, the flame rod and hot surface igniter must not be touched with bare hands
11. Restore gas and test all inlet gas connections for leaks using soapy water solution
12. Allow heater to light and test all outlet gas connections from leaks using soapy water solution. **NOTE:** On the 631275 it will be necessary to hold the door switch closed while conducting the leak test

Main Burner Injector Replacement (Procedure 4)

1. Follow Procedure 3 (Burner Replacement) to step 7

265 Models

2. Remove the screws retaining the burner to the jacket and withdraw the burner slightly
3. Remove the spring clip and remove the burner feed pipe assembly from the burner bracket

275 Models

2. Remove the 2 screws retaining the injector bracket to the burner
3. Remove the burner feed pipe assembly

Both

4. Remove the injector from the burner feed pipe
5. Fit the replacement injector using an approved gas sealant. **Note:** Sealant should be used sparingly to prevent blockage of the injector
6. Reassemble in reverse order of above. **Note:** On indoor models ensure the lip on the bottom of the gas control cover engages inside the jacket opening
7. Allow heater to light and test all outlet gas connections from leaks using soapy water solution. **NOTE:** On the 631275 it will be necessary to hold the door switch closed while conducting the leak test

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Igniter/Flame Rod replacement (Procedure 5)

Use Procedure 3 (Burner Replacement)

Ignition Module Replacement (Procedure 6)

1. ***Remove 3-pin plug from GPO (note warning on page 59)***
2. *Outdoor Models* - Remove the lower access door

   Indoor Models - Remove the gas valve cover **Note:** It will be necessary to disconnect the wiring to the thermostat, temperature sensor and ignition module to allow complete removal of the gas valve cover
3. *Outdoor Models* - Disconnect the multi-pin plug at the ignition module
4. Remove the ignition module (2 screws on outdoor models, retaining tabs on indoor models)
5. Reassembly in reverse order of above

   Note:

   Outdoor Models - The moisture shield must be refitted to the ignition module

   Indoor Models - Ensure the lip on the bottom of the gas control cover engages inside the jacket opening
6. Restore power and test operation

Thermostat Replacement (Procedure 7)

1. ***Remove 3-pin plug from GPO (note warning on page 59)***
2. *Indoor Models* - Remove the gas valve cover **Note:** It will be necessary to disconnect the wiring to the thermostat, temperature sensor and ignition module to allow complete removal of the gas valve cover

   Outdoor Models - Remove the upper access cover and disconnect the power supply and sensor multi-pin connectors to the thermostat
3. Remove the thermostat retainers from the left and right sides of the thermostat by pressing on the centre lug and sliding the retainer towards the rear of the thermostat Note: On outdoor models it may be necessary to remove the rain shield to provide easier access to the retainers
4. Remove the thermostat
5. Slide the replacement thermostat into place ensuring the sealing gasket has no twists
6. Reassemble in the reverse order of above. **Note:** On indoor models ensure the lip on the bottom of the gas control cover engages inside the jacket opening
7. Restore power, adjust the set point and check the thermostat parameters are set correctly (refer to the 'Electronic Thermostat Adjustment' section on page 25

Flue Terminal Replacement (Procedure 8)

1. ***Remove 3-pin plug from GPO (note warning on page 59)***
2. Remove the screws holding the flue terminal to the air duct.
3. Remove the flue terminal.
4. Reassemble in reverse order of above.
5. Refit the access door.

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Temperature Sensor Replacement (Procedure 9)

The temperature sensors must be replaced as a set

1. ***Remove 3-pin plug from GPO (note warning on page 59)***
2. *Outdoor Models* - Remove the upper access door; disconnect the power supply and sensor multi-pin connectors to the thermostat. Remove the lower access door.

   Indoor Models - Remove the gas valve cover **Note:** It will be necessary to disconnect the wiring to the thermostat, temperature sensor and ignition module to allow complete removal of the gas valve cover
3. *Indoor and Outdoor models* - Remove the upper and lower electrical covers
4. Remove the temperature sensors from each sheath
5. *Outdoor models* - Withdraw the cold sensor from the conduit

   Indoor models - Withdraw the hot sensor from the conduit

   Note: Attaching a draw wire to the sensor will assist in drawing the replacement sensor through the conduit
6. *Outdoor models* – Fit the replacement cold sensor (blue band on insulation) through the conduit

   Indoor models – Fit the replacement hot sensor (red band on insulation) through the conduit
7. Insert the temperature sensors into each sheath. **Note:** Ensure the temperature sensor is reinserted all the way to the end of the sheath, the opening should be sealed with silicone to prevent the sensor moving
8. Complete reassembly in reverse order of above
9. Restore power, test operation and ensure displayed water temperature and actual water temperature match.

Temperature Sensor Sheath Replacement (Procedure 10)

1. ***Remove 3-pin plug from GPO and isolate the water supply to the water heater (note warning on page 59)***
2. ***Relieve pressure from the water heater through T&PR valve or a hot tap***
3. Drain the water heater (Refer to Procedure 1)
4. *Outdoor models* - Remove the upper or lower access cover depending on which sheath is to be accessed. Note: If removing the upper access cover disconnect the power supply and sensor multi-pin connectors to the thermostat
5. *Indoor and Outdoor models* – Remove the upper or lower electrical cover depending on which sheath is to be accessed
6. Remove the temperature sensor
7. Using a 27mm socket, remove the sheath
8. ***Apply thread-sealing tape to the sheath thread and tighten***
9. Refill the water heater, ensure air is purged from cylinder and pipe work.
10. Check for leaks
11. Reassemble in reverse order of above **Note:** Ensure the temperature sensor is reinserted all the way to the end of the sheath, the opening should be sealed with silicone to prevent the sensor moving

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Limit Thermostat Replacement (Procedure 11)

1. ***Remove 3-pin plug from GPO (note warning on page 59)***
2. *Outdoor Models* - Remove the lower access door

   Indoor and Outdoor models - Remove the lower electrical cover

   Note: The limit thermostat can be reset by pressing the small button in the centre of the terminals, replacement may not be necessary
3. Disconnect wiring to the limit thermostat
4. Remove the screw retaining the limit thermostat to the bracket and remove the thermostat
5. Reassemble in the reverse order of above
6. Restore power and test operation

Anode Inspection or Replacement (Procedure 12)

H.S.I heavy duty models are fitted with 3 anodes

1. ***Remove 3-pin plug from GPO & isolate water supply to heater (note warning on page 59)***
2. ***Relieve pressure through a hot tap or the T&PR valve.***
3. *Outdoor models* - Remove screws from the jacket top and from top of front air duct and remove the jacket top, air duct and flue terminal assembly.

   Indoor models - Disengage the flue, remove screws from the jacket top and remove the jacket top, draught diverter and flue damper (if fitted) assembly
4. Using a 27mm tube or socket spanner, unscrew and remove the anode(s).
5. Apply thread sealing tape to anode(s) thread, refit and tighten.
6. Restore water supply and check for leaks.
7. Complete reassembly in reverse order of above
8. Restore power and water supplies

Temperature & Pressure Relief Valve Replacement (Procedure 13)

Never fit a T&PR valve with a rating higher than that indicated on the water heater rating label. Do not use reconditioned T&PR valves

1. ***Remove 3-pin plug from GPO & isolate water supply to heater (note warning on page 59)***
2. ***Relieve pressure from the water heater through the T&PR valve or a hot tap***
3. Remove the drain line from the T&PR valve
4. Unscrew the T&PR valve and remove

   A quantity of hot water will discharge from the tank during this process. Personal Protective Equipment should be worn to prevent scalds or burns
5. Confirm the replacement T&PR valve is the correct rating and refit using thread tape
6. Refit the drain line
7. Close the hot tap and restore water supply
8. Check T&PR valve thread for leaks
9. Operate the T&PR valve lever to reset relief drain
10. Purge air from the system through hot taps
11. Restore power and water supplies

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Dip Tube Replacement (Procedure 14)

1. ***Remove 3-pin plug from GPO & isolate water supply to heater (note warning on page 59)***
2. ***Relieve pressure from the water heater through the T&PR valve or a hot tap.***
3. Disconnect the hot water line from the outlet of the water heater.

   A quantity of hot water will discharge from the outlet during this process. Personal Protective Equipment should be worn to prevent scalds or burns.
4. Using a flat blade screwdriver gently split the outer rim at the top and bottom of the dip tube face and prise the dip tube out of the cylinder fitting.
5. Fit the replacement dip tube into the cylinder fitting ensuring the flat lines up with the fitting (dip tube facing up) and gently drive the dip tube into the fitting a short distance.
6. Apply thread tape to the plumbing fitting and refit; this will push the dip tube into the correct location.
7. Reconnect the hot water line and restore the water supply.
8. Purge air from the system through hot taps.
9. Restore the power.

Components Specific to 621275

Flue Damper Assembly Replacement (Procedure 15)

NOTE: A blown fuse in the flue damper does NOT indicate a fault with the damper. The fault may be with the ignition module, gas valve, thermostat or damaged wiring.

1. ***Remove 3-pin plug from GPO (note warning on page 59)***
2. Remove the upper and lower electrical covers
3. Disconnect the wiring to the flue damper (lower electrical opening) and attach a draw wire. Note wiring connections for reconnection of the replacement flue damper wiring.
4. Withdraw the wiring loom out of the conduit at the upper electrical opening
5. Withdraw the wiring loom up through the jacket top. Note: It may be necessary to open up the insulation between the upper electrical opening and the jacket top to allow the wiring to pass through
6. Disengage the flue and remove the draught diverter
7. Remove the screws holding the flue damper assembly to the jacket top and remove damper assembly
8. Reassemble in reverse order of above
9. Restore power and test operation

Flue Damper Actuator Replacement (Procedure 16)

1. Follow Procedure 15 (Flue Damper Assembly Replacement) to step 5
2. Remove the screws holding the actuator to the flue damper assembly and remove the actuator
3. Reassemble in reverse order of above. **Note:** Ensure the butterfly shaft engages the actuator shaft correctly when refitting the actuator. The butterfly should be in the open position
4. Restore power and test operation

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Components Specific to 631275

The fan motor, capacitor, relay, relay base, pressure switch and impulse tube all form part of the 'fan module' assembly which is mounted in the air duct assembly at the front of the heater.

Pressure Switch Replacement (Procedure 17)

1. ***Remove 3-pin plug from GPO (note warning on page 59)***
2. Remove the upper access door and disconnect the power supply and sensor multi-pin connectors to the thermostat
3. Remove the fan module wiring cover (1 screw) **Note:** Access the fan module wiring cover through the upper opening in the air duct
4. Disconnect the wiring from the pressure switch. Note position of wiring connections for reconnection of replacement pressure switch
5. Remove retaining screws (2), withdraw the pressure impulse tube from the fan chamber and remove the pressure switch
6. Remove the pressure impulse tube and inspect for splits or damage. If undamaged fit to the replacement pressure switch ensuring the tube is on the correct side
7. Reassemble in reverse order of above. **Note:** Ensure the pressure impulse tube is reinserted into the fan chamber and there are no kinks in the hose
8. Restore power and test operation

Impulse Tube Replacement (Procedure 18)

1. ***Remove 3-pin plug from GPO (note warning on page 59)***
2. Remove the upper access door and disconnect the power supply and sensor multi-pin connectors to the thermostat
3. Remove the fan module wiring cover (1 screw) **Note:** Access the fan module wiring cover through the upper opening in the air duct
4. Disconnect the tube from the pressure switch and withdraw from the fan chamber
5. Reassemble in reverse order of above. **Note:** Ensure the pressure impulse tube is reinserted into the fan chamber and there are no kinks in the hose
6. Restore power and test operation

Relay Base Replacement (Procedure 19)

1. Follow Procedure 21 (Fan Motor Replacement) to step 6
2. Remove the fan module wiring cover (1 screw)
3. Disconnect the wiring from the relay base. Note position of wiring connections for reconnection of replacement base
4. Remove retaining screws (2) and remove the relay base
5. Reassemble in reverse order of above. **Note:** When refitting the air duct a bead of silicone MUST be applied to both edges where the air duct engages the heater jacket to prevent water ingress
6. Restore power and test operation

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Relay Replacement (Procedure 20)

1. ***Remove 3-pin plug from GPO (note warning on page 59)***
2. Remove the upper access door and disconnect the power supply and sensor multi-pin connectors to the thermostat
3. Remove the fan module wiring cover (1 screw) **Note:** Access the fan module wiring cover through the upper opening in the air duct
4. Unplug the relay from the base
5. Reassemble in reverse order of above
6. Restore power and test operation

Fan Motor Replacement (Procedure 21)

1. ***Remove 3-pin plug from GPO (note warning on page 59)***
2. Remove the lower access door
3. Disconnect wiring to ignition module and the door switch
4. Remove the upper access door and disconnect the power supply and sensor multi-pin connectors to the thermostat
5. Remove screws securing the air duct. **Note:** It is not necessary to remove the screws around the base of the air duct or the screw securing the cord bracket to the jacket
6. Pull the air duct out at the bottom then slide down to disengage from the top air duct. **Note:** The air duct is sealed to the heater jacket using silicone; care should be taken not to damage the air duct when breaking the silicone seal
7. Remove the 4 screws (2 at the front and 1 on each side of the air duct) and remove the fan module. **Note:** Support the fan module when removing the screws to prevent it falling and being damaged
8. Remove the fan module wiring cover (1 screw) and disconnect the fan motor wiring. Note position of wiring connections for reconnection of replacement motor
9. Remove the fan motor support bracket (4 screws)
10. Remove the fan motor from the bracket (4 screws)
11. Reassemble in reverse order of above. **Note:** When refitting the air duct a bead of silicone MUST be applied to both edges where the air duct engages the heater jacket to prevent water ingress
12. Restore power and test operation

Capacitor Replacement (Procedure 22)

1. Follow Procedure 21 (Fan Motor Replacement) to step 6
2. Remove the fan module wiring cover (1 screw)
3. Disconnect the capacitor wiring. Note position of wiring connections for reconnection of replacement capacitor
4. Undo the retaining nut and remove the capacitor
5. Reassemble in reverse order of above. **Note:** When refitting the air duct a bead of silicone MUST be applied to both edges where the air duct engages the heater jacket to prevent water ingress
6. Restore power and test operation

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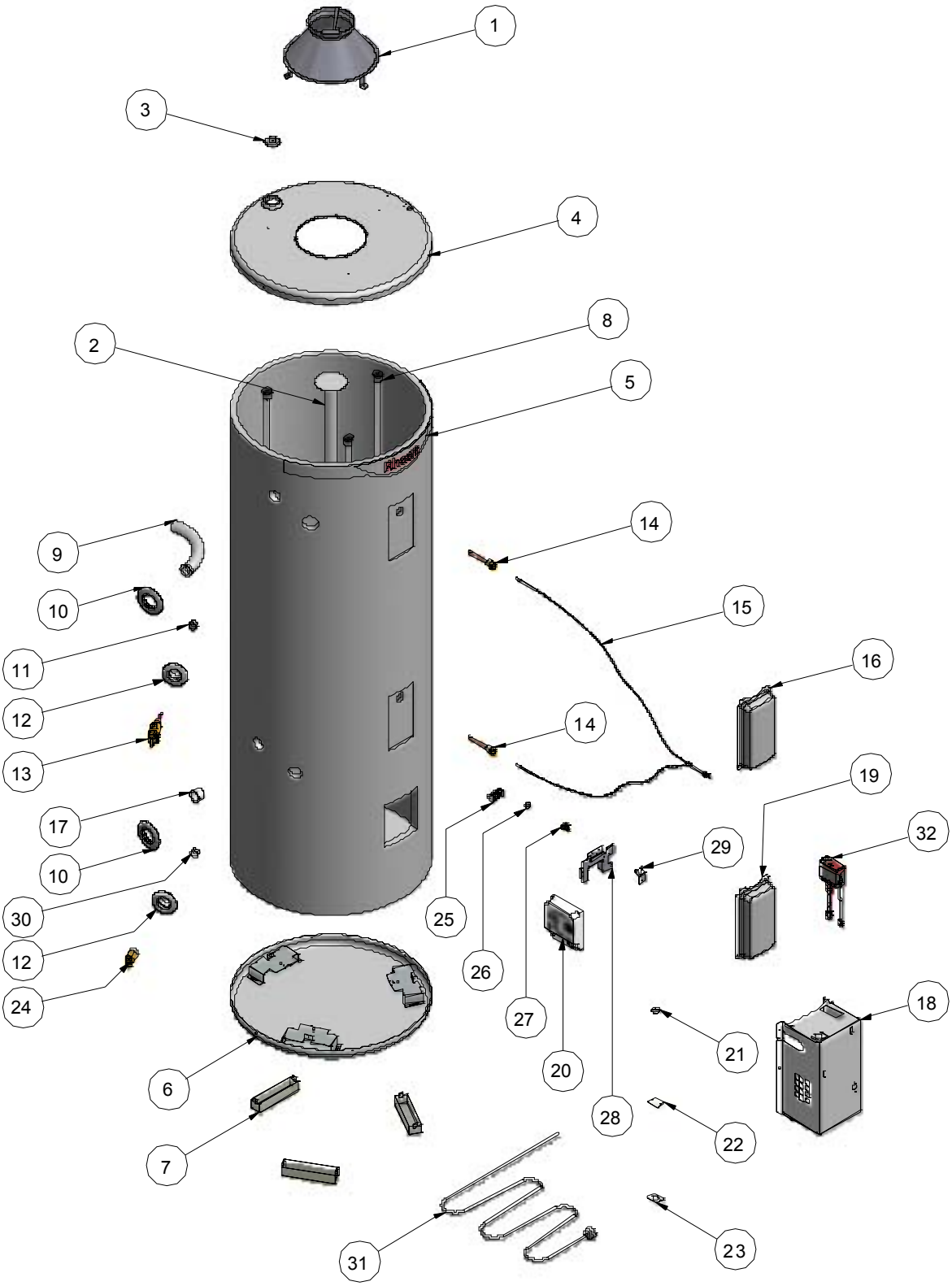
621265 Exploded View



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Replacement Parts List – 621265

Item	Description		Part Number
1	Draught diverter		108113
2	Flue baffle		108189
3	Foam Cover		221735
4	Jacket top		101217-1
5	Name band		120629
6	Jacket base		108158-1
7	Foot		108107
8	Anode	Black	221914
		Blue	221924
		Green	222014
9	Dip tube		220511
10	Pipe Seal – Inlet & Outlet		221406-1
11	Fitting Liner (¾" Noryl)		229460
12	Pipe Seal (¾" x 31)		221358-1
13	T & PR valve		220604
14	Temperature sensor adaptor probe		079427
15	Sensor Set		890280
16	Electrics front cover upper		100704-1
17	Fitting Liner – Inlet (1¼" x 26)		229450
18	Cover Gas control		108354
19	Electrics front cover lower		100701-1
20	Control module		079612
21	Gasket		087016
22	Window		080016
23	Window clamp		108258
24	Drain cock		224813
25	Terminal block BP 4 Way		051602
26	Grommet		080122
27	ECO thermostat – manual reset		053008
28	Bracket – Thermostat Mount		108135
29	Bracket – ECO Mount		108177
30	Fitting Liner (¾")		221001
31	Cord set		053001
32	Electronic thermostat		890279
NI	Wiring assembly – electronic thermostat		052922
	Wiring loom		052927
	Bridging Wire		052723
	ECO Wire		052930

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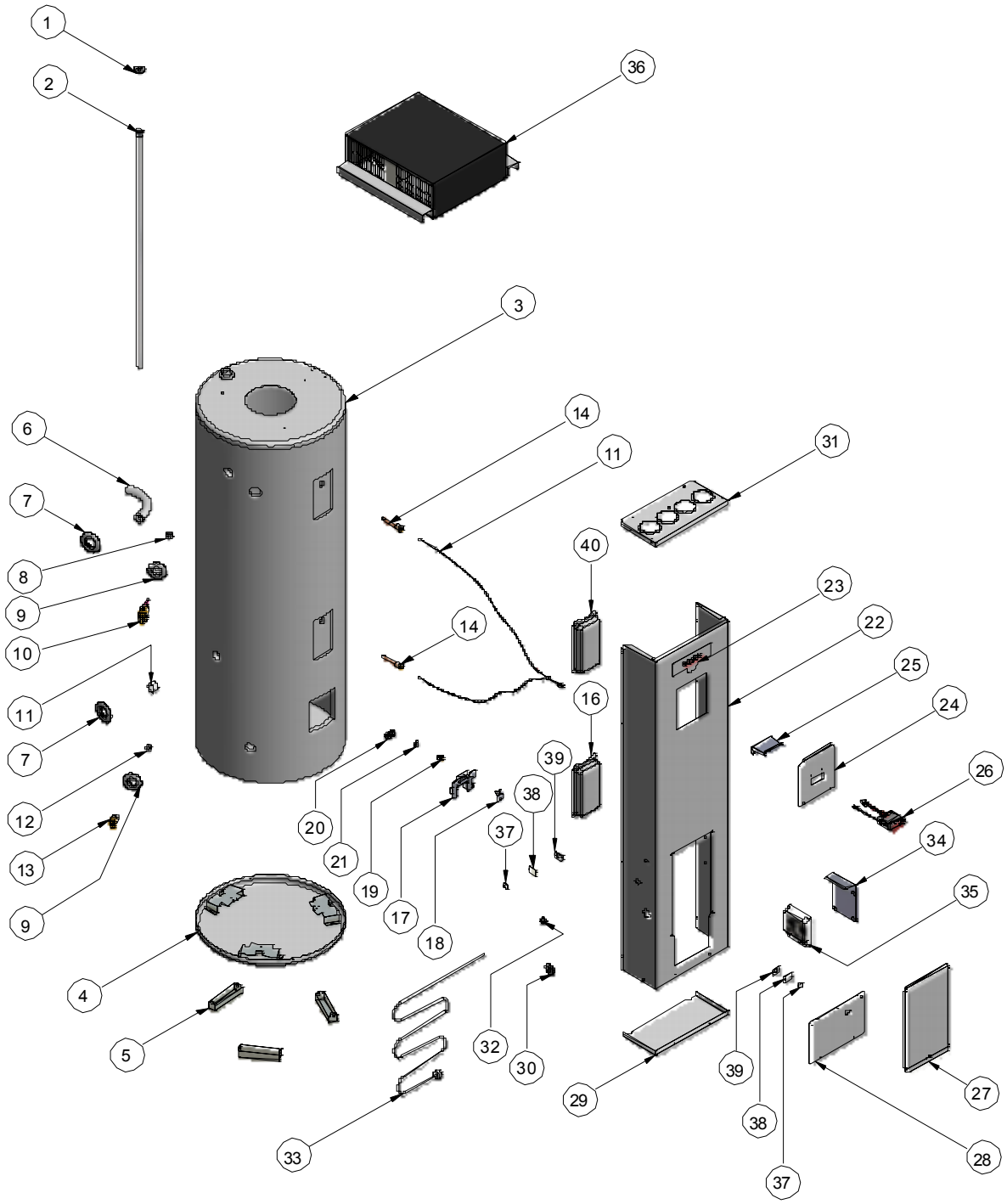
631265 Exploded View



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Replacement Parts List – 631265

Item	Description		Part Number
1	Foam Cover		221735
2	Anode x 3	Black	221914
		Blue	221924
		Green	222014
3	Jacket top		101217-1
4	Jacket base		108158-1
5	Foot		108107
6	Dip tube		220511
7	Pipe Seal – Inlet & Outlet		221406-1
8	Fitting Liner (¾" Noryl)		229460
9	Pipe Seal (¾" x 31)		221358-1
10	T & PR valve		220604
11	Fitting Liner – Inlet (1¼" x 26)		229450
12	Fitting Liner (¾")		221001
13	Drain cock		224813
14	Temperature sensor adaptor probe		079427
15	Sensor Set		890280
16	Electrics front cover - lower		100701-1
17	Bracket – Thermostat Mount		108135
18	Bracket – ECO Mount		108177
19	ECO thermostat – manual reset		053008
20	Terminal block BP 3 Way		051601
21	Grommet		080122
22	Air duct		108090-1
23	Name strip		120806
24	Access panel upper		108268
25	Thermostat Rain Shield		108269
26	Electronic thermostat		890279
27	Lower Access Door		104599-1
28	Burner access panel		108352-1
29	Air duct base		108204
30	Grommet (17ID x 47)		080063
31	Air duct top		108172-1
32	Cord clamp		053003
33	Cord set		053001
34	Rain Guard – ignition module		108266
35	Control module		079612
36	Flue terminal assembly		108164-1
37	Gasket		087016
38	Window		080016
39	Window clamp		108258
40	Electrics front cover upper		100704-1
NI	Wiring assembly – electronic thermostat		052923
	Wiring loom		052927
	Wire ECO		052930

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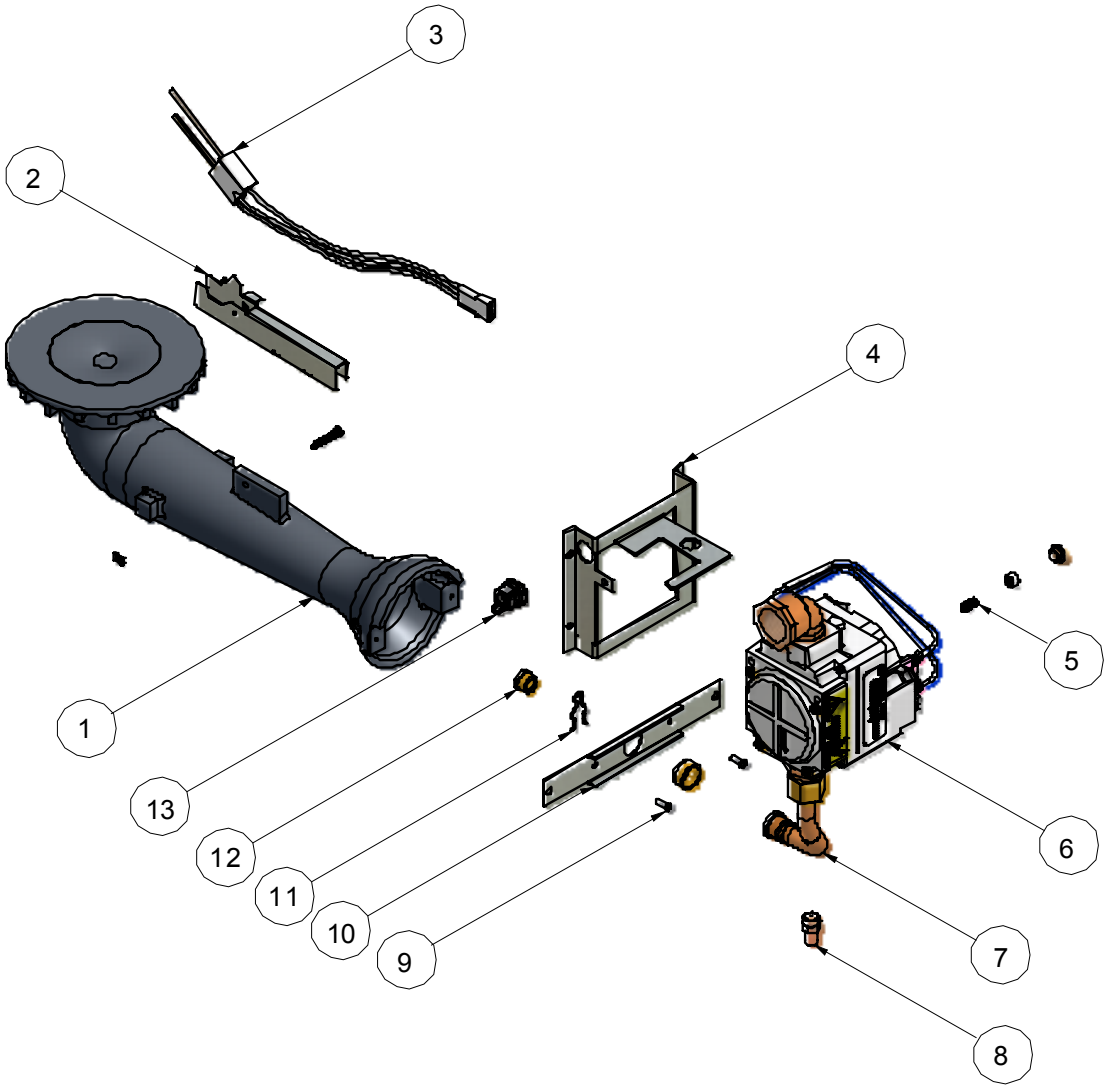
Burner Assembly Exploded View – 265L



Replacement Burner Parts List – 265L

Item	Description		Part Numbers
1	Burner assembly		074453
2	Igniter holder		145403
3	H.S.I igniter and flame probe		071420
4	Gas control bracket		108000
5	Regulator Spring - Propane / Butane		079520
	Regulator Spring - Natural / TLP		079530
6	Gas valve – White Rogers		079500
7	Burner Feed Pipe		079510
8	Test point spigot		079506
9	Rivet		088009
10	Support Brace		108133
11	Spring Clip		088003
12	Main burner injector	Natural Gas	073502
		Propane Gas	073503
		TLP Gas	073501
		Butane Gas	073504
13	Cord clamp		053003

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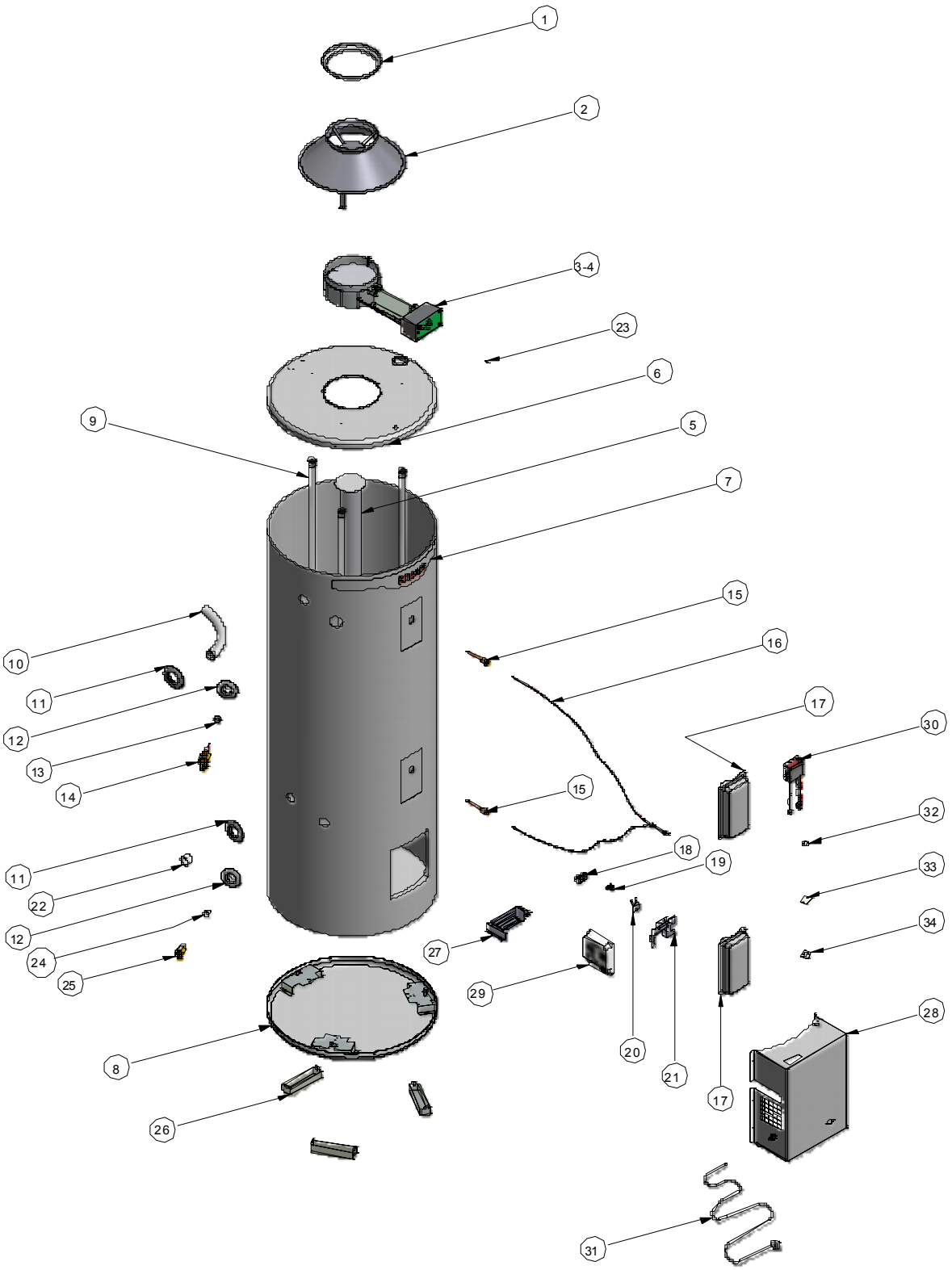
621275 Exploded View



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Replacement Parts List – 621275

Item	Description		Part Number
1	Draught diverter adapter		147502
2	Draught diverter		108145
3	Flue damper complete		053045
4	Flue damper actuator		890160
5	Flue baffle		108154
6	Jacket top		140316-1
7	Name band		120629
8	Jacket bottom		108152-1
9	Anode	Black	221914
		Blue	221924
		Green	222014
10	Dip tube		220511
11	Pipe seal – inlet & outlet		221406-1
12	Pipe seal (¾" x 31)		221358-1
13	Fitting Liner (¾" Noryl)		229460
14	T & PR valve		220604
15	Temperature sensor adapter probe		079427
16	Temperature Sensor set		890280
17	Electrics front cover upper & lower		100701-1
18	Terminal Block – BP 4 way		051602
19	ECO Thermostat – Manual Reset		053008
20	Bracket – ECO Mount		108177
21	Bracket – Thermostat Mount		108135
22	Fitting liner - Inlet		229450
23	Flue damper fuse		890305
24	Fitting liner (¾")		221005
25	Drain cock		224813
26	Foot		108107
27	Heat Shield		108603
28	Gas control cover		108355
29	Ignition module		079612
30	Thermostat		890279
31	Cord set		053001
32	Gasket – Viewing window		087016
33	Window Insert		080016
34	Clamp plate – sight glass		108258
NI	Wiring loom		052927
	Wiring assembly - electronic thermostat		052924
	Wire - ECO		052930
	Bridging wire		052723
	Cover – Foam		221735

* NI – Not illustrated

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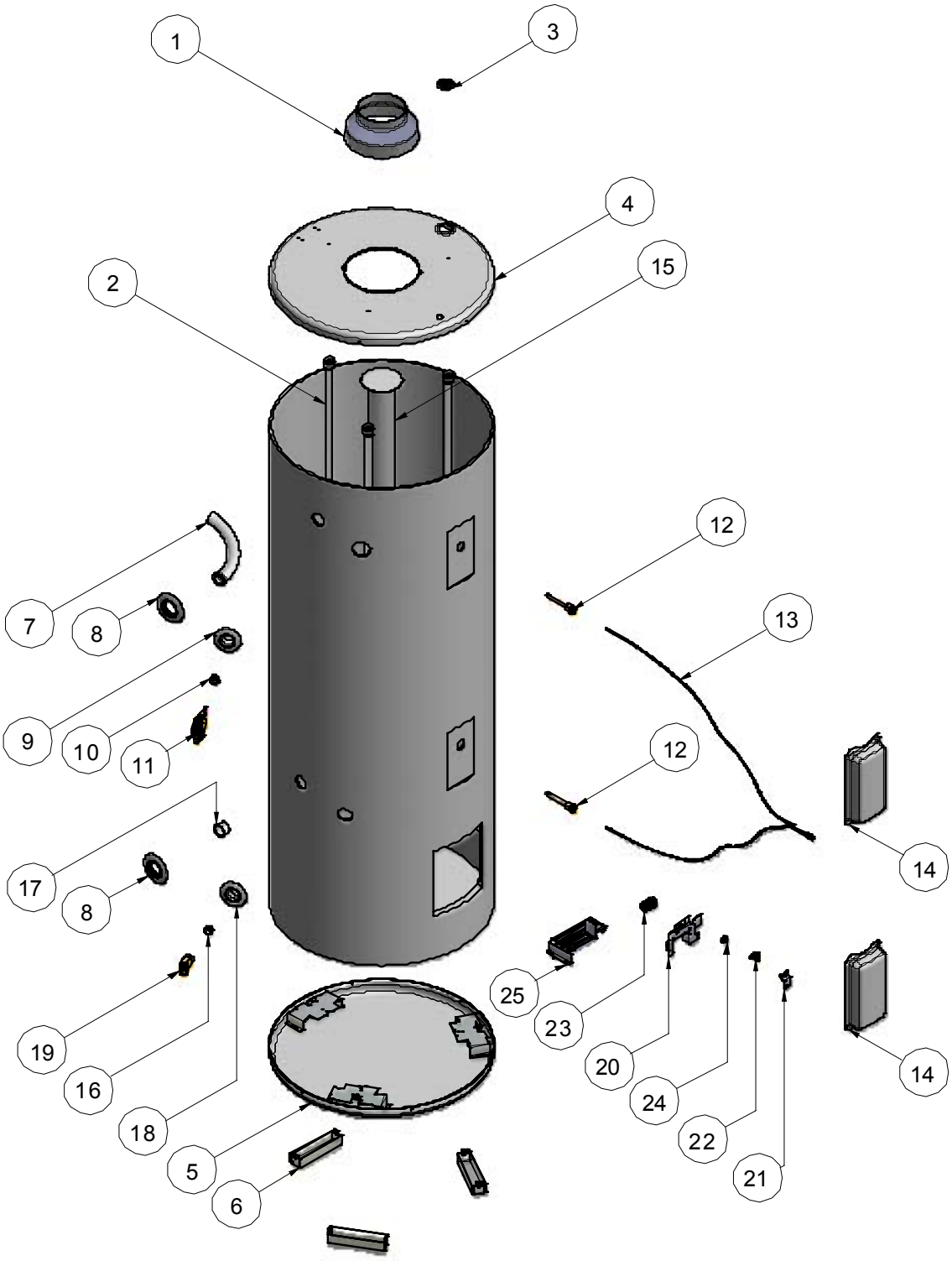
631275 Exploded View - Heater



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Replacement Parts List – 631275 (Heater)

Item	Description		Part Number
1			
2	Anode	Black	221914
		Blue	221924
		Green	222014
3	Cover – Foam		221735
4	Jacket top		140316-1
5	Jacket bottom		108152-1
6	Foot		108107
7	Dip tube		220511
8	Pipe seal – inlet & outlet		221406-1
9	Pipe seal (¾" x 31)		221358-1
10	Fitting Liner (¾" Noryl)		229460
11	T & PR valve		220604
12	Temperature sensor adapter probe		079427
13	Temperature Sensor set		890280
14	Electrics front cover upper & lower		100701-1
15	Flue baffle		108154
16	Fitting liner (¾")		221005
17	Fitting liner - Inlet		229450
18	Pipe seal (¾" x 31)		221358-1
19	Drain cock		224813
20	Bracket – Thermostat Mount		108135
21	Bracket – ECO Mount		108177
22	ECO Thermostat – Manual Reset		053008
23	Terminal block – BP 3 Way		051601
24	Grommet		080122
25	Heat shield assembly - burner		108603

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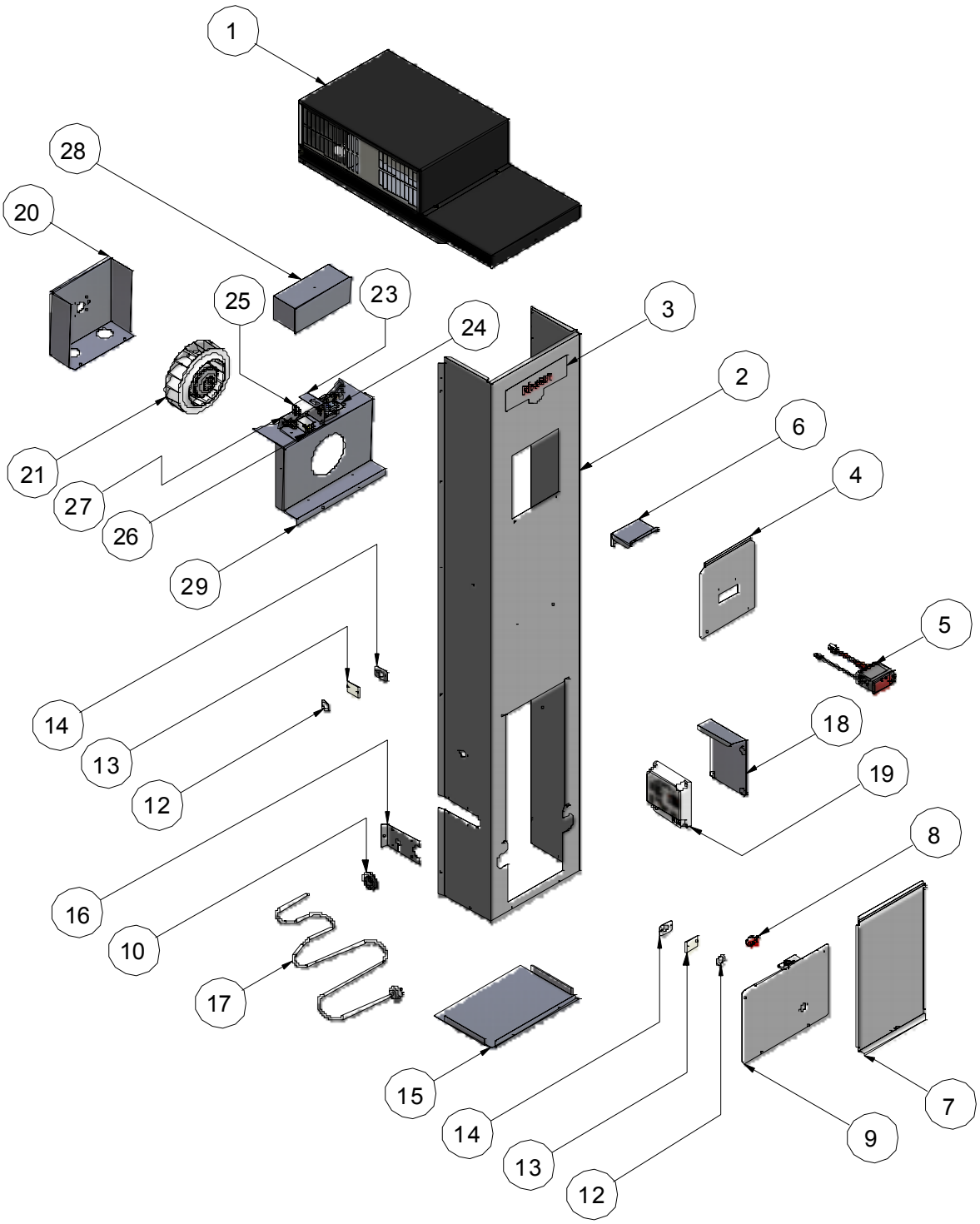
631275 Exploded View – Air Duct & Flue Terminal



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Replacement Parts List – 631275 (Air Duct & Flue Terminal)

Item	Description	Part Number	
1	Flue Terminal assembly	108249	
2	Air duct	108092-1	
3	Name strip	120806	
4	Access Cover - upper	108268	
5	Thermostat	890279	
6	Thermostat - Rain Shield	108269	
7	Access cover - lower	104599-1	
8	Door switch	054056	
NI	Switch insulator	079405	
9	Burner access panel	108346-1	
10	Grommet (17ID x 47)	080063	
12	Gasket – Viewing window	087016	
13	Window Insert	080016	
14	Clamp plate – sight glass	108258	
15	Air duct base	108222	
16	Air duct plate	108179-1	
17	Cord set	053001	
18	Rain Guard – Ignition Module	108266	
		Pre 09/02/05	**After 09/02/05**
19	Ignition module	079612	079615
20	Fan box	108255	108255
21	Fan motor	053011	053011
23	Mounting bracket relay	108235	108235
24	Pressure switch	053014	053014
NI	Pressure impulse tube	053015	053015
25	Capacitor	053047	053047
26	Relay	053012	Not Fitted
27	Relay base	053013	Not Fitted
28	Cover relay bracket	108236	108236
29	Fan mounting plate	108260	108260
NI	Wiring loom - module	052926	052934
	Wiring assy - electronic thermostat	052925	052923
	Wiring assy - fan module	052931	Not fitted
	Wire – micro switch	052929	052929
	Wire – ECO	052930	052930

* NI – Not illustrated

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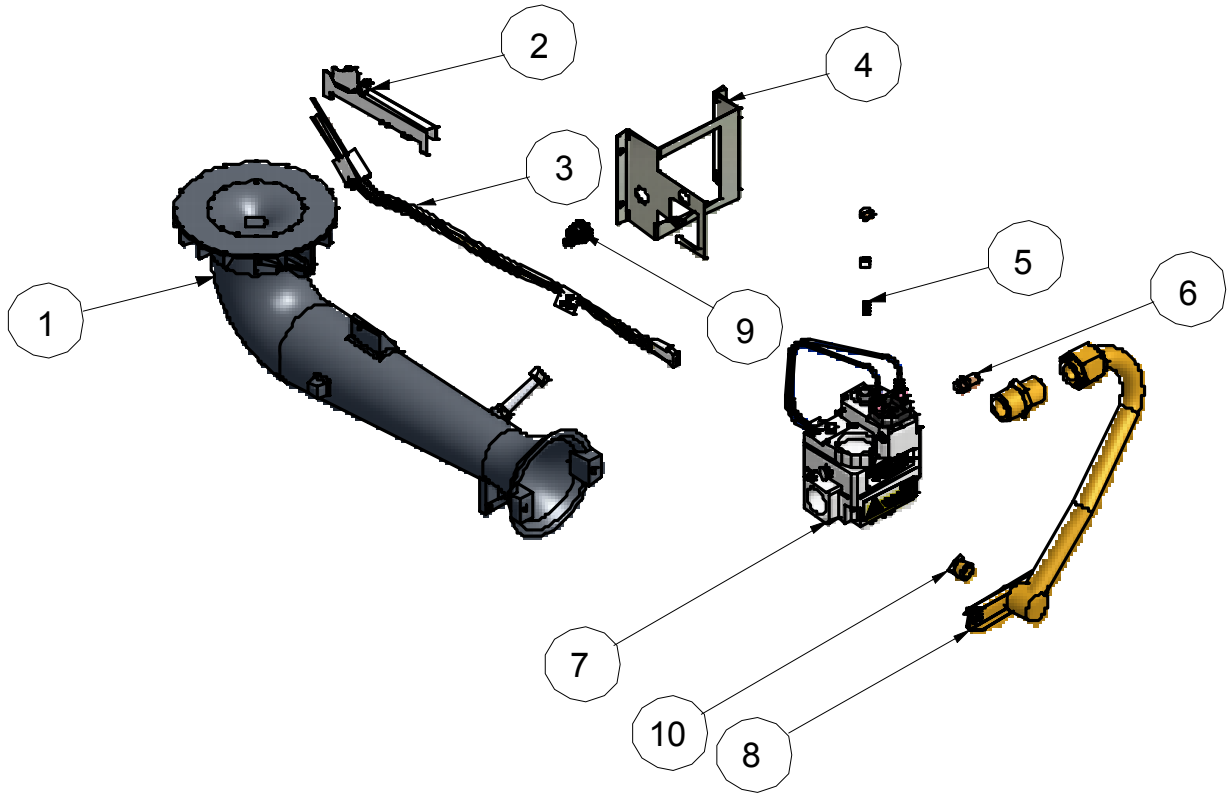
Burner Assembly Exploded View – 275L



Replacement Burner Parts List – 275L

Item	Description		Part Numbers
1	Burner Assembly		074454
2	Igniter Holder		145405
3	H.S.I Igniter and flame probe		071420
4	Gas valve bracket		108001
5	Regulator spring – Propane / Butane		079520
	Regulator spring – Natural / TLP		079530
6	Test point spigot		079506
7	Gas valve – White Rogers		079500
8	Burner feed pipe		073105
9	Cord Clamp		053003
10	Main burner injector	Natural Gas	073907
		Propane Gas	073903
		TLP Gas	073901
		Butane Gas	073904

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For <u>warehouse</u> gas type conversions the burner operation and gas tightness testing must be completed by dry firing the water heater or fully assembled burner/gas control assembly. Do NOT leave the main burner on for more than 30 seconds if dry firing. Where gas is unavailable for testing, gas type conversions must NOT be conducted.

1. ***Isolate the gas and power supplies to the water heater.***
2. Remove the access door and burner access panel (outdoor models) or the gas control cover (indoor models). **Note**: On 631275 models it will be necessary to disconnect the wiring to the door switch to remove the burner access panel.

Injector Replacement

3. Remove the 2 screws retaining the injector holding bracket to the burner (275 models) or to the water heater jacket (265 models)
4. *265 models:* Disconnect the burner feed pipe from the gas control, withdraw the entire burner slightly, remove the spring clip and remove the burner feed pipe

   275 models: Disconnect the burner feed pipe from the gas control and remove the burner feed pipe.
5. Unscrew the main injector and replace with one suitable for the supply gas type and model (refer to page 80) using suitable gas thread sealant.
6. Refit the burner feed pipe in reverse order of steps 3 and 4 above.

Gas Control

7. Remove the gas pressure regulator cap, gas pressure adjuster and existing regulator spring. Fit a replacement spring suitable for the gas type (refer to page 80) and refit the adjuster.

Reassembly and Testing

8. Refit the burner access panel (outdoor models) and reconnect the door switch wiring (631275 models)
9. Fit manometer to burner test point
10. Restore gas and power supplies, allow heater to light and ***test all unions with soapy water solution for gas leaks***. **NOTE:** On 631275 models it will be necessary to hold the door switch closed.
11. Adjust the burner pressure to that suitable for the supply gas type and model (refer to page 80) and refit the gas pressure regulator cap.
12. Adjust the burner interrupter screw. On natural, propane and butane gases the interrupter screw is normally set flush with the burner casting (fully out) for Towns or TLP gas adjust the interrupter screw to achieve a stable blue flame.
13. Turn power to the water heater off, remove manometer and refit test point screw and sealing washer securely.
14. Replace gas type label with one suitable for the supply gas type and adjust details of injector size and burner pressure on rating plate to reflect the supply gas type (refer to page 80).
15. Refit the access door (outdoor models) or the gas control cover (indoor models) and restore power to the water heater.

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265 Gas Conversion Replacement Parts List

Conversion components

Component		Component Part Number			
		Natural Gas	Butane Gas	LP Gas	Town Gas
Main Burner Injector	Size (mm)	4.80	2.50	2.90	8.60
	Part N°	073502	073504	073503	073501
Gas Control / Regulator Spring		079530	079520	079520	079530
Gas Type Label		121802	121804	121805	121801

Settings

	Natural Gas	Butane Gas	LP Gas	Town Gas
Burner Pressure Setting (kPa)	0.85	2.50	2.50	0.32
Max Gas Supply Pressure (kPa)	3.5	3.5	3.5	3.5
Min Gas Supply Pressure (kPa)	1.13	2.75	2.75	0.75

275 Gas Conversion Replacement Parts List

Conversion components

Component		Component Part Number			
		Natural Gas	Butane Gas	LP Gas	Town Gas
Main Burner Injector	Size (mm)	6.50	3.20	3.80	10.50
	Part N°	073907	073904	073903	073901
Gas Control Regulator Spring		079530	079520	079520	079530
Gas Type Label		121802	121804	121805	121801

Settings

	Natural Gas	Butane Gas	LP Gas	Town Gas
Burner Pressure Setting (kPa)	0.90	2.65	2.65	0.50
Max Gas Supply Pressure (kPa)	3.5	3.5	3.5	3.5
Min Gas Supply Pressure (kPa)	1.13	2.75	2.75	0.75

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Rheem Water Heater (Excluding Solar) Warranty

- Australia Only -

WARRANTY CONDITIONS

1. This warranty is applicable only to water heaters manufactured from 1st January 2002.
2. The water heater must be installed in accordance with the Rheem water heater installation instructions, supplied with the water heater, and in accordance with all relevant statutory and local requirements of the State in which the water heater is installed.
3. Where a failed component or water heater is replaced under warranty, the balance of the original warranty period will remain effective. The replaced part or water heater does not carry a new warranty.
4. Where the water heater is installed outside the boundaries of a metropolitan area as defined by Rheem or further than 25 km from a regional Rheem branch office, or an Accredited Service Agent, the cost of transport, insurance and travelling costs between the nearest Rheem Accredited Service Agent's premises and the installed site shall be the owner's responsibility.
5. The warranty only applies to the water heater and original or genuine (company) component replacement parts and therefore does not cover any plumbing or electrical parts supplied by the installer and not an integral part of the water heater, e.g. pressure limiting valve; isolation valves; non-return valves; electrical switches; pumps or fuse.
6. The water heater must be sized to supply the hot water demand in accordance with the guidelines in the Rheem water heater literature.

WARRANTY EXCLUSIONS

1. REPAIR AND REPLACEMENT WORK WILL BE CARRIED OUT AS SET OUT IN THE RHEEM WATER HEATER WARRANTY, HOWEVER THE FOLLOWING EXCLUSIONS MAY CAUSE THE WATER HEATER WARRANTY TO BECOME VOID AND MAY INCUR A SERVICE CHARGE AND / OR COST OF PARTS.

   (a) Accidental damage to the water heater or any component, including: Acts of God; failure due to misuse; incorrect installation; attempts to repair the water heater other than by a Rheem Accredited Service Agent or the Rheem Service Department.

   (b) Where it is found there is nothing wrong with the water heater; where the complaint is related to excessive discharge from the temperature and / or pressure relief valve due to high water pressure; where there is no flow of hot water due to faulty plumbing; where water leaks are related to plumbing and not the water heater or water heater components; where there is a failure of gas, electricity or water supplies; where the supply of gas, electricity or water does not comply with relevant codes or acts.

   (c) Where the water heater or water heater component has failed directly or indirectly as a result of: excessive water pressure; excessive temperature and / or thermal input; corrosive atmosphere.

   (d) Where the water heater is located in a position that does not comply with the Rheem water heater installation instructions or relevant statutory requirements, causing the need for major dismantling or removal of cupboards, doors or walls, or use of special equipment to bring the water heater to floor or ground level or to a serviceable position.

   (e) Repairs to the water heater due to scale formation in the waterways when the water heater has been connected to a harmful water supply as outlined in the Owner's Guide and Installation Instructions booklet.

2. SUBJECT TO ANY STATUTORY PROVISIONS TO THE CONTRARY, THIS WARRANTY EXCLUDES ANY AND ALL CLAIMS FOR DAMAGE TO FURNITURE, CARPETS, WALLS, FOUNDATIONS OR ANY OTHER CONSEQUENTIAL LOSS EITHER DIRECTLY OR INDIRECTLY DUE TO LEAKAGE FROM THE WATER HEATER, OR DUE TO LEAKAGE FROM FITTINGS AND / OR PIPE WORK OF METAL, PLASTIC OR OTHER MATERIALS CAUSED BY WATER TEMPERATURE, WORKMANSHIP OR OTHER MODES OF FAILURE.

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Document Revision History

Title: - Service Instructions For Rheem Heavy Duty Gas	Document Number: TM011

Revision	Details of change	D.O.I.
A	Service Instructions issued for H.S.I Heavy Duty Gas models	03/06

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